

# Rhodora

JOURNAL OF THE  
NEW ENGLAND BOTANICAL CLUB

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Conducted and published for the Club, by

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Vol. 42.

May, 1940.

No. 497.

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The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

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**RHODORA**.—A monthly journal of botany, devoted primarily to the flora of New England. Price, \$2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1-8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. Fernald, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa., Post Office as Second Class Mail Matter.

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## SUGGESTIONS FOR COLLECTORS

JOHN M. FOGG, JR.

SEVERAL articles have appeared during the last few years urging that collectors of vascular plants exercise greater care in the preparation and documentation of their field specimens.<sup>1</sup> That these suggestions have been seriously taken to heart and rigorously put into practice by all of us is a consummation which, however devoutly it may be desired, probably lies nearer to the millenium than to the present. Perhaps the very multiplicity of the rules prescribed may, in some measure, defeat the results they are designed to accomplish. Even the conscientious collector, feeling himself incapable of obeying all of the "don'ts" and "musts," may adopt a "what's the use" attitude and lapse into his former indifferent habits.

Yet it is a sad fact that all herbaria contain far too many specimens which have little or no value for the serious student, merely because the collector neglected to procure representative portions of the plant or failed to supply on his label such vitally important information as the color of the corolla or the fruit when fresh. All too frequently such an inadequate sheet will be the only one from an area of strategic significance, yet the monographer or phytogeographer will be forced to ignore it because of its imperfections. I can speak feelingly on this subject as I am at present engaged in a study of the flora of

<sup>1</sup> *Collecting, Drying and Mounting of Plant Specimens*. J. Lunell. Amer. Midl. Nat. 5: 191 (1918). *The Preparation of Botanical Specimens for the Herbarium*. I. M. Johnston. Arnold Arb. 1939. *Plant Collecting Manual for Field Anthropologists*. F. R. Fosberg. Philadelphia, Pa., 1939.



Pennsylvania which involves the careful examination of something like two hundred thousand sheets from five important herbaria. A distressingly large number of these specimens can not be cited because their poor quality makes satisfactory identification impossible. Some are too immature, some lack the basal parts, others are sterile, while in still others the reproductive structures are too poorly displayed or their nature too inadequately noted on the label to permit them to be studied effectively. These are just a few of the deficiencies which render much herbarium material practically useless. A great many other sheets have to be ignored in any floristic work because the locality data supplied on the label are too ambiguous or inaccurate. But that is another matter, one with which I am not at present concerned.

It has long seemed to me that if the average collector had in mind a selected list of the most necessary chores he would be more likely to accomplish them than if the ideal of absolute perfection were held up before him. An example or two may serve to make clear what I mean.

We have all been taught, and continue to teach those who follow us, that to be acceptable a specimen of an herbaceous plant should include, whenever possible, the complete underground system. In actual practice, however, many collections are made in which only the tops of the plant are secured or in which the roots have been incompletely lifted or imperfectly cleaned. It is not enough merely to loosen the soil with the point of a pick or trowel and then pull; every effort should be made to remove the base of the plant intact from the ground and then to wash it clean so as to display all the subterranean structures. Now it must be admitted that perhaps the majority of our native plants can, according to the present manual treatments, be identified in the absence of their underground parts. And certainly no conscientious botanist would encourage the extermination of rare and localized species by insisting that their roots be destroyed. Nevertheless it is a fact that in an increasing number of genera important diagnostic characters are found to reside in the roots and rhizomes. Recent revisions of such critical groups as *Scleria*, *Streptopus* and *Rhexia* have conclusively demonstrated that a thorough understanding of the

specific entities involved can be gained only from material in which the basal organs are fully exhibited. The number of such genera increases yearly and an attempt will be made below to emphasize only the more outstanding ones.

Another type of effort concerns the recording of observations which can be made only in the field or on fresh material. No taxonomist would deny the fundamental usefulness of notes dealing with, let us say, the color and markings of the corolla. Yet lamentably few labels bear such data. Perhaps collectors feel that the approximately 5000 species in the Gray's Manual range can be recognized with sufficient ease and certainty to render unnecessary the noting down of these facts. They allow the dried specimen to speak for itself and in many instances its eloquence justifies their confidence in it. In countless other cases, however, the pressed plant is incapable of saying for itself what we could so easily have said about it on the label, had we taken the trouble. Two examples must suffice to illustrate this point. Our two native eastern species of *Impatiens* can be readily distinguished on the basis of the color of their corollas, yet I venture to say that not more than one collector in ten records this evidence on his label. Perhaps the remaining nine comfort themselves with the thought that there is a second character in the relative length of the spurs which will serve to separate these two plants when carefully pressed, and so long as no subspecific categories were recognized this view may have been warranted. But in 1925 Weatherby published a paper calling attention to several distinct color forms in *I. biflora*, the recognition of which depends primarily on the pattern of marking on the corolla.<sup>1</sup> The student of plant distribution would like to know whether these forms are of mere sporadic occurrence or whether they have separate geographic ranges. Unfortunately, these answers will not be forthcoming until such time as collectors have learned to make such observations in the field and transcribe them on their herbarium labels.

Or take, as a second instance, the structure and color of the flowers of certain Orchidaceae. Anyone who attempts to determine from dried material the species of such genera as *Corallo-rhiza*, *Spiranthes* and *Habenaria* realizes how important is a

<sup>1</sup> RHODORA 21: 98 (1919).



knowledge of the length and shape of the spur and the nature and markings of the lip. This information may of course be partly gained by boiling up the dried flowers. But collectors would confer a real and time-saving service to students if they would only take the slight pains necessary to ascertain and record these facts while they have the fresh specimens in hand.

Perhaps it can not reasonably be expected that an active field botanist, one, say, who collects two or three thousand numbers during a growing season, will have time and energy to make such notes on every sheet he prepares. It is therefore the function of this article to call attention to those particular groups in which, at least in the light of our present knowledge, this kind of observation will prove most helpful to the monographer and the student of distribution.

Before passing to the individual examples, however, there is one general matter which appears to me of such signal importance that it deserves separate and special emphasis, and that is the collecting of extra flowers and fruits. Whenever possible, it is highly desirable to secure additional material of the reproductive structures for subsequent dissection and study. In the case of grasses, sedges, rushes and many other groups it is a simple matter to procure and place in press with the specimen a number of inflorescences or tops from neighboring plants. Great care should of course be exercised to insure that these are taken from members of the same colony or the same undoubted species, in order that no mixture occurs. When the species is fruticose or arboreal, additional sprays or individual flowers can readily be removed from the same plant and laid in press. These supplementary parts can eventually be placed in pockets affixed to the mounted sheet and an abundance of material for study will thus be available without having to destroy or mutilate the herbarium specimen.

The following examples are arranged in systematic sequence and although the list is designed primarily for field work in eastern temperate North America it may in large measure be applied to other sections of the country. Grateful acknowledgement is due my friend and companion on many field-trips, Mr. Bayard Long, who has scrutinized these "agenda" and suggested several pertinent additions. Professor M. L. Fernald and Mr.

C. A. Weatherby have likewise made valuable suggestions which are incorporated herein.

**POLYPODIACEAE.** There is evidenced on the part of collectors an increasing tendency to content themselves with but a single leaf when pressing ferns. This practice may be condoned in the case of some of the larger forms, but only if an attempt is made to secure a sporulating frond and to lay it out so that the sori are clearly displayed. In the case of dimorphic types both sterile and fertile fronds should be collected. In both instances it is well to get the entire stipe, since diagnostic characters may reside in the lowermost scales. In such genera as *Athyrium* (especially *A. angustum* and *A. asplenoides*) and *Cystopteris* the nature of the rootstock has been stressed in recent revisions; it should therefore be collected or notes made on its habit. In *Dryopteris spinulosa* and closely related species it is vitally important to arrange the lower pair of pinnae so that the relative lengths of the pinnules may be clearly seen.

**LYCOPIDIUM.** The separation of *L. tristachyum* and *L. complanatum*, var. *flabelliforme* is greatly facilitated by a knowledge of the position of their rootstocks. These should either be collected or a note made as to whether they are deep-seated or superficial.

**ISOETES.** Most herbaria contain far too many sterile specimens of this genus. For critical study material possessing megaspores, and in some cases microspores, is essential. Notes on habitat, and whether the plant was emerged or submerged, will prove helpful. A highly praiseworthy practice is that of splitting several of the plants vertically and mounting them so that the opened inner half is exposed. This will reveal the important structure of the inner side of the leaf-base without requiring the mutilation of the rosette, as would otherwise be the case. All detached sporophylls should be saved and pocketed.

**PICEA.** Differentiation between *P. rubra* and *P. mariana* is often difficult and, in the case of much herbarium material, practically impossible. Mature cones are of utmost value, as are notes on the color of the fresh foliage.

**PINUS.** Here, likewise, cones are often needed for satisfactory identification. In the case of tall trees, they may frequently be found on the ground directly underneath, and may with reasonable safety be added to the specimen. Notes should always be provided on the character of the bark and the height of the tree.

**NAJADACEAE** and all small-leaved floating aquatics must be carefully floated out on sheets of white paper. This can readily be done in the field, if sheets of plain paper are carried in the press, or at home by utilizing a basin or pan of water. Con-



siderable care may be needed to avoid mounting two or more species on the same sheet. In the linear-leaved species of *Potamogeton* stipules have been found important and ought, when present, to be clearly displayed.

ELODEA (ANACHARIS). Recent treatments of this genus have stressed floral characters. Botanists who have ready access to localities where these plants grow would do well to defer their collecting of them until such season as flowers are present.

GRAMINEAE. Grasses are usually easy to collect and press, and there is no excuse for making poor specimens. Many sheets err in being too copious. It is better in many densely tufted species to divide the plant (taking care to note on the label "Portion of clump") than to crowd the sheet so that the inflorescences may be poorly shown and such diagnostic characters as the ligules completely obscured. At least some of the leaves should be pressed out perfectly flat, so that their width may be measured. If the specimen itself does not show whether the plant was caespitose or stoloniferous, this information may be noted on the label. As mentioned above, extra tops in this and the next family are highly useful.

CYPERACEAE. In many sedges the base of the plant is of great importance and an effort should be made to lift it intact. Here again there is usually an advantage in not having the sheet too full. The sheath is often of critical significance, especially in *Carex*, and in good specimens some of the culms will be so arranged as to display it. Collectors will do well to refrain from gathering *Carex* before the perigynia have filled out; herbaria are already too well supplied with immature specimens which can never be satisfactorily named. Overripe material is almost as undesirable, although in this case the disintegrating spikes can often be salvaged and placed in pockets.

ARISAEMA. Recent work has shown the character of the corm, and whether or not it produces offsets, to be helpful in separating species. Notes are needed as to whether the under side of the leaflet is green or glaucous and on the shape and coloration of the spathe. The characteristic fluting of the spathe of *A. Stewardsonii* is usually not discernible in the pressed specimen and the student is always grateful when this information is supplied on the label.

COMMELINACEAE. Observations on the color of the petals and the anthers are very acceptable in *Tradescantia* and *Commelina*. In both these genera the flowers can be successfully preserved by placing them between folds of waxed paper.

JUNCUS. Many of the points mentioned under grasses and sedges apply also to the rushes. With a little care in the laying out of the plant the structure of the ligule, which is all-important in some species, can be brought into view. Everyone who has



attempted to identify our eprophyllate rushes has had difficulty with specimens in which it was almost impossible to determine whether the number of stamens was 3 or 6. This is a matter which can often easily be settled in the fresh condition and a note to this effect will save much time spent in boiling up dry flowers.

**ALLIUM.** Comments on the nature of the bulb-coat (whether membranous or reticulated) are in order here. Even when the bases are carefully collected, the bulb-coats frequently fall apart and are lost before the plant is mounted. Since the leaves may be either flat or terete, and this is not always easily seen in the mounted specimen, this too should be mentioned.

**ERYTHRONIUM.** The color of the perianth merits a note. In cases where the relative lengths of the stigmas may not be shown, color provides the best differentiation between *E. americanum* and *E. albidum*.

**SMILAX.** If the specimen is collected from the top of the plant, the label should tell whether the main axis was prickly or unarmed. A statement on the color of the fruit is always welcome.

**STREPTOPUS.** Fassett's recent revision of this genus stresses the nature of the basal system in separating the varieties of *S. roseus*.

**DIOSCOREA.** The distinction between *D. villosa* and *D. quaternata* is brought out more clearly by collecting typical portions of the main stem, rather than just the tips. In both, the leaves may be alternate near the top of the plant, but lower down the axis the verticillate phyllotaxy of the latter species is clearly seen. The rhizomes, too, are strikingly different.

**IRIS.** Here, again, the use of waxed paper is necessary in order perfectly to preserve the perianth.

**SISYRINCHIUM.** While the temptation to collect these attractive plants in flower is great, it should be remembered that the taxonomic usefulness of fruiting material is much greater.

**ORCHIDACEAE.** Information concerning the shape, color and markings of the lip (labellum) is well nigh indispensable in many orchid genera, e. g., *Habenaria*, *Spiranthes*, *Listera*, *Corallorhiza*. As a specific instance may be mentioned the very close resemblance between *Habenaria ciliaris* and *H. blephariglottis*. The conformation of the lip is almost identical in these two species and flower-color furnishes the best character for differentiation. In many dried specimens however, especially older ones, it is impossible to tell whether the corolla was white or yellow and a separation which would have been rendered certain by a simple entry on the label is reduced to guesswork.

**SALIX.** A critical knowledge of willows can, in many cases, be acquired only by collecting flowers, leaves and fruit from the same plant. Since these usually mature at different times it may

be necessary when gathering flowers; to tag the plant so that it may be visited again some weeks later for foliage and fruit. Often old fruiting catkins may be found on the ground beneath the plant. If their origin is not open to question, they may be added to the sheet and a note made on the label, "Collected from ground beneath specimen."

CARYA. Either a section of bark should be collected or a note supplied on its character; preferably both. Observations on the height and shape of the tree are also helpful.

BETULA. Good specimens of birches will include a strip of bark. An effort should be made to procure fruiting catkins and to note the size and shape of the tree.

QUERCUS. Too few specimens of oaks are provided with fruit. While not always vital for purposes of identification, acorns are essential to the understanding of certain critical species. Facts concerning the height of the tree are also helpful in a few cases, such as puzzling forms of *Q. prinoides* and *Q. Muhlenbergii*.

CELTIS. Notes on the color and shape of the ripe fruit, as well as the size of the tree, are of real value.

CARYOPHYLLACEAE. The separation of *Lychnis* and *Silene*, often difficult in pressed material, is a simple affair when the number of styles is known; this fact is easy to ascertain and note when the fresh flowers are in hand. A knowledge of whether the flowers are perfect or imperfect will further serve to differentiate *L. alba* and *S. noctiflora*, which are superficially so nearly identical. Notes on corolla-color are also very desirable.

NUPHAR (NYMPHOZANTHUS). Observations are needed in our spatterdocks on the shape of the petiole in transverse section (whether terete or plano-convex) and on the position of the leaf-blades (whether erect or floating).

RANUNCULUS. The root-systems are important in certain species.

THALICTRUM. Current treatments stress the structure and color of the root system, which should be collected even if a second sheet be necessary for pressing and mounting it.

ARABIS. Mature fruit is highly desirable in many species of this genus.

DENTARIA. The rootstocks of *Dentaria* may be shallow or deep-rooted and prominently or obscurely toothed or jointed. These facts will bear noting.

LEPIDIUM. The presence or absence of petals is more easily observed in fresh than in dry material and warrants a field-note.

HEUCHERA. In a recent revision of the alum-roots, we are required to determine whether the hypanthium is actinomorphic or zygomorphic; this is another of those points more readily ascertainable in fresh specimens.



RIBES. The color of the berries is a matter of real interest, especially in the group of the currants (subgenus *Ribesium*).

TIARELLA. The presence or absence of stolons is a feature worthy of attention; also, the color of the corolla.

AGRIMONIA. Good supporting characters are furnished by the roots or rootstocks; only seldom can these be employed in the average herbarium specimen, most of which lack bases.

AMELANCHIER. Flowers and fruit (especially the partially mature pomes) from the same individual are of prime importance in the study of our service-berries. A comment on the height of the plant is likewise helpful. In the stoloniferous species, even though the bases may not be collected, the habit should certainly be noted. Leaves of the preceding year, collected under flowering shrubs, may prove of real importance.

CRATAEGUS. This is admittedly one of the most difficult genera in eastern North America. An understanding of specific entities here can be gained only by securing flowers and fruit from the same tree; another case of revisiting marked specimens in the field. Observations are required on the approximate number of the stamens and the color of the anthers.

GEUM. The color of the petals of the small white- or yellow-flowered species of avens is frequently indistinguishable in dried material.

PYRUS (subgenus ARONIA). Notes on the color of the fresh fruit will obviate considerable guesswork in herbarium specimens of *P. arbutifolia* and its variety *atropurpurea*. The color of the anthers is also said to have diagnostic value.

ROSA. Some of the difficulties encountered in the study of this critical genus will be lessened when collectors learn to note on their labels the height of the plant, whether or not it was stoloniferous and whether it was shrubby or climbing. The foliage of the older, mature canes of *Rosa* often differs significantly from that of the vigorous new shoots. Both should therefore be collected; at least it is well to avoid taking only the latter, even though they frequently bear flowers.

RUBUS. The foliage of the flowering shoots (floricanes) and that of the sterile ones (primocanes) are usually significantly dissimilar. Orthodox methods dictate that material from both be collected and that the labels bear the symbols "part 1" and "part 2," or some other designation indicating that the two sheets appertain to the same plant. Of fundamental importance, also, is a knowledge of habit, especially in the subgenus *Eubatus*. Professor Fernald kindly furnishes the following manuscript comment. "In collecting, careful note should be made of habit, whether the canes are prostrate and tip-rooting, doming or arching and tip-rooting, or with no rooting tips. Without such careful records identification is most difficult."

**DESMODIUM.** The present classification of this genus is based primarily on fruit characters. However, the flowers are proving increasingly useful and material in bloom should not be neglected, especially if care is taken to note color and conformation of the corolla.

**LESPEDEZA.** Information on habit, whether trailing or erect, will facilitate the separation of closely related species, such as *L. repens* and *L. violacea*.

**MELILOTUS.** Since color is the most conspicuous character differentiating *M. alba* and *M. officinalis* it should be noted before it is lost in drying.

**TRIFOLIUM.** The difficulty occasionally met with in distinguishing *T. hybridum* from *T. repens* in the herbarium may be obviated by a statement concerning habit.

**EUPHORBIA.** The shape of the cyathium and the number, color and shape of the glands are of taxonomic significance and ought, whenever possible, to be recorded before the plants are dried.

**IMPATIENS.** Notes are helpful on the basic color of the corolla and of the nature of the markings on its throat.

**VITIS.** Bailey, in his recent monograph of our native grapes, stresses the structure of the carpellate flowers and the color of the pith as seen in longitudinal sections of the branchlets. Young vine-tips are important, as are notes on color and size of fruit.

**PARTHENOCISSUS.** *P. quinquefolia* and *P. vitacea* can be satisfactorily separated only when the inflorescences are faithfully pressed so as to show the method of branching.

**HYPERICUM.** Many a student has encountered obstacles in the divisions of the key which call for a knowledge of the number of stamens and the manner of their arrangement into groups. These points may be quickly and accurately established in the fresh condition, but if this is not done laborious boiling up of the dried flowers may be required.

**LECHEA.** The leaves of the basal rosettes of this genus furnish valuable taxonomic characters. This is one of the many important types of material which can be collected during the dormant season, when far too little botanizing is done.

**VIOLA.** Everyone who has worked with herbarium specimens of violets has had occasion to deplore the poorly preserved condition of many of the flowers. A serious and genuine effort should be made to press carefully at least a few of the corollas on each plant. This may be facilitated by placing small pieces of moist paper over the opened corollas as the plants are laid out for drying. Notes on flower color will also be appreciated.

**RHEXIA.** This is another genus in which recent studies have focussed attention on the underground system. This is often very delicate and needs to be lifted carefully and washed gently. The petals are fugacious. Properly to display them plants



should be collected and placed in press early in the day. If a vasculum is employed the flowers may be wrapped in waxed paper as early as possible in the morning.

OPUNTIA. Modern treatments of our eastern prickly pears have laid emphasis on habit, thus inviting us to observe and note whether the plant was procumbent or upright. Large clumps should of course be divided for pressing. Individual segments may be split longitudinally and scooped out to expedite drying.

CORNUS. The scientific usefulness of specimens of *Cornus* will be materially increased by noting the color of the branches and the fresh fruit. A section of a branch should be split longitudinally to reveal the color of the pith.

SYMPETALAE. In the case of all tubular-flowered forms it is highly desirable that several extra corollas be collected, split open and pressed out flat so as to show such features as the attachment of the stamens, ratio of limb to throat, etc. This is more useful in genera of the Gentianaceae, Convolvulaceae, Polemoniaceae, Boraginaceae and a few others which will be listed in order.

RHODODENDRON. Statements concerning the height of the plant and the color of the corolla are needed.

VACCINIUM. Of paramount importance in the blueberries is information concerning the height of the plant. Also helpful are notes on the color of the flower and the fruit, especially on whether or not the latter is glaucous.

FRAXINUS. In most herbaria there is a lamentable dearth of good fruiting material of *Fraxinus*. This should be on every collector's list of desiderata. Good characters have recently been demonstrated in the anthers and the calyx.

GENTIANA. Here is one of the most urgent needs for pressing some of the opened corollas flat, as mentioned above.

SABATIA. Complete root-systems are of great importance in this genus.

APOCYNUM. Observation should be made on the shape of the corolla as well as its color.

CUSCUTA. The nature of the petals and their appendages can be best made out in the fresh flower; it is almost impossible to study the flowers of *Cuscuta* by boiling. The shape of the fruit likewise deserves mention.

CONVOLVULUS and IPOMOEA. By slitting and opening out the corolla, the shape of the stigma is disclosed and the distinction between these genera clarified.

POLEMONIACEAE. Here, also, the need for seeing the corolla opened out is great. Importance attaches in *Phlox*, for instance, to the structure of the androecium and the length of the style. A further desideratum in this genus is the complete root system, both in fertile and sterile plants.

**BORAGINACEAE.** This is another family in which the opening of the corolla should always be practiced. In some genera it is necessary to observe the accessory lobes which alternate with the petals; these can only be studied by adopting such a procedure.

**LYCOPUS.** The structure of the base of the plant is of interest here. The roots need to be carefully dug and cleaned. Observations on the length of the stamens are also in order.

**SOLANACEAE.** In the tubular-flowered forms (*Nicotiana*, *Datura*, *Petunia*, etc.) the corolla should be opened and laid out flat. The difficult genus *Physalis* seems to offer possibilities for a better interpretation based on a study of flower-structure.

**SCROPHULARIACEAE.** Not only should some of the corollas be pressed out open but, since this is one of those families in which remarkable adaptations to insect pollination are seen (especially in the tubular-flowered genera—*Penstemon*, *Gerardia*, etc.) notes on shape, color, bearding and markings of the corolla are desired. In *Gerardia* and allied genera the corollas are fugacious. Fine specimens may be secured by collecting heavily budded individuals and placing them in rolled wet newspapers with their tips toward the light. Early the following morning the flowers will have opened and are then ready for the press.

**GALIUM.** Most keys call for a knowledge of habit; the label ought therefore to tell whether the plant was erect or reclining.

**VALERIANELLA.** Notes on the color of the corolla are advantageous, as are observations on the ratio of the sterile to the fertile cells of the fruit.

**CAMPANULA.** The shape of the corolla, whether campanulate, rotate, etc., is of interest. This information may be conveyed by a note or by opening and pressing some of the flowers flat; preferably both.

**COMPOSITAE.** In all Composites, especially those with radiate florets, it is highly desirable that at least a few of the heads be very carefully pressed. Some should face upward, so as to show the character of the disc florets, the receptacle, etc., while others ought to be reversed, in order to bring out the nature of the involucre. This may appear difficult in genera with high receptacles, such as *Rudbeckia* and *Heliopsis*, but can usually be accomplished by the use of thick cotton pads placed over the specimen but *outside* the collecting paper.<sup>1</sup> A highly commendable practice is the breaking open of a separate head, the fragments of which may be retained in a pocket. This will greatly facilitate the study of chaff, pappus, achenes, etc.

**ANTENNARIA.** The procedure suggested under *Gerardia* of placing plants overnight in moistened newspapers will result in good straight flowering stalks in *Antennaria*.

<sup>1</sup> See Fosberg, op. cit. p. 21.



**ASTER.** A good working specimen of *Aster* will possess representative foliage from different levels, not merely dismembered axes or tops. A note on the color of the rays will be extremely helpful.

**BIDENS.** Many herbarium sheets contain a mixture of two or more species of *Bidens*. Great care is needed, especially in collecting the smaller forms, which often occur as widely scattered individuals, to secure a uniform series under each number. Mature fruit is as important as flowers in this genus.

**ERIGERON.** Greater attention needs to be paid to the lower leaves and basal rosettes.

**EUPATORIUM.** In *E. purpureum* and related species observations are required on flower-color, approximate number of florets in a head and whether the stem is solid or hollow.

**HELIANTHUS.** If the specimen fails to show whether the cauline leaves are alternate or opposite, this fact merits a note on the label. The underground parts will probably be given greater weight in future treatments of sunflowers.

**LACTUCA.** Mature fruit is of prime importance in this genus and useful corroborative evidence is contributed by the color of the florets.

**SENECIO.** Basal leaves and rosettes are of special interest in this difficult genus.

**SOLIDAGO.** As in *Aster*, with additional attention directed to the basal rosettes and stolons, when present. Excellent taxonomic characters have recently been developed on the basis of the subterranean organs.

HERBARIUM, UNIVERSITY OF PENNSYLVANIA.

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#### ALBINO FORMS OF THE BEACH PEA.—

**LATHYRUS JAPONICUS** Willd., var. **ALEUTICUS** (Greene) Fernald, forma **albinus**, f. nov., corollis albidis. TYPE from LABRADOR: Northwest River, Lake Melville, July 30, 1921, *R. H. Wetmore*, Nat. Herb. Can. no. 102,994 (in Gray Herb.).

**L. JAPONICUS**, var. **PELLITUS** Fernald, forma **candidus**, f. nov., corollis albidis. TYPE from MASSACHUSETTS: Osterville, June, 1890, *Susan Minns* (in Gray Herb.).—M. L. FERNALD.

## SPERGULARIA IN NORTH AND SOUTH AMERICA

RUTH P. ROSSBACH

(Continued from page 143)

17. *S. FASCICULATA* Philippi (PLATE 593, FIGS. 1a-1d and MAP 13). Perennial: *caudex* well developed, branched and knotted, bearing 2- $\infty$  diffuse, often rebranching stems,<sup>1</sup> 10-30 cm. long; *internodes of stem below the inflorescence* 5-35 mm. long, 0.6-1.1 mm. in diameter, shortly glandular-pubescent, only the oldest internodes becoming nearly glabrous by shedding their pubescence; *leaves densely fascicled*, setaceous, glandular-pubescent, usually filiform, but occasionally fleshy, 6-30 mm., usually 10-20 mm. long, 0.2-1 mm., usually 0.2-0.6 mm. wide; *stipules broadly lanceolate, lacerate at the tip or usually for as much as one half their length*, 4.5-7 mm. long; *inflorescence a short, open cyme*, glandular-pubescent throughout; *the internodes* 6-30 mm., usually 9-15 mm. long, 0.2-0.6 mm. in diameter; *bracts* 1-6 mm. long, the upper minute, *sepals linear-lanceolate, glandular-pubescent*, 5-10 mm.,<sup>2</sup> usually 5-8 mm. long; *petals white, ovate*, 4-10 mm., usually 4-6 mm. long, equal to or as much as 1.5 mm. shorter than the calyx; *stamens* 10; *styles* 3, 1.5-2.5 mm. long, *united when young, separating to as much as 0.6 mm. from the apex as flower matures*; *mature capsules* 5-7 mm. long, equal to the calyx or overtopped by the calyx by as much as 2 mm., or occasionally exceeding the calyx by as much as 1 mm.;<sup>3</sup> *fruiting pedicels* not reflexed, filiform, 6-17 mm. long; *seeds dark reddish brown or nearly black, often silvery, nearly pyriform in outline, deeply sculptured in closely interwoven, vermiform pattern, covered with lighter brown glandular papillae, or not papillose*, 0.8-1 mm. long, *surrounded by a narrow, white or brownish, scarious wing with entire margin less than 0.1 mm. wide, or not winged*.—Anal. Mus. Nac. Chile, viii. (Cat. Prael. Pl. Itin. Tarapaca, F. Philippi Lect.) 6 (1891). *Tissa Stuebelii* Hieron. in Engl. Bot. Jahr. xxi. 308 (1895). *T. fasciculata* (Philippi) Reiche, Fl. Chile, i. 197 (1896). *S. Stuebelii* (Hieron.) I. M. Johnston in Contrib. Gray Herb. lxxxi. 90 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 633 (1937). *S. media* sensu Macbride, l. c. 632 (1937),<sup>4</sup> non *Arrnaria media* L. (1762). *S. laciniata* Baehni & Macbride ex Macbride, l. c. 631.—SOUTH AMERICA: in the mountains of Peru and adjacent Chile. PERU: DEPT. LIBERTAD: Prov. Huamachuco: roadway between Oyon and Hamade de Peñon, Distr. Cajatambo, *Raimondi* 2110, April, 1868 (B.). DEPT. ANCASH: Prov. Cajatambo: growing with

<sup>1</sup> Also stems of the last growing season may give rise to new stems at their nodes.

<sup>2</sup> C. Troll 3161 has some of the sepals 10 mm. long but a style 2.5 mm., united nearly to apex and 10 stamens.

<sup>3</sup> See R. S. Williams 2560 (K., N. Y.).

<sup>4</sup> Cites Weberbauer 2751 (?) Ocos, Ancash, which is immature. Macbride's description here seems to be a peculiar combination of the characters of true *S. media* and of the Weberbauer plant, which is *S. fasciculata* (see citations!). A comparison of the diagnostic characters of these two species will show their great dissimilarity.



Cactaceae and Bromeliaceae, 3000–3200 m. alt., Ocos, *Weberbauer* 2751, March 31, 1903 (B., immature). DEPT. LIMA: Prov. Lima: mountains near Choisica (Lima-Aroyo R. R.) 1700–1800 m. alt., *Weberbauer* 5334, April, 1910 (G., U. S., F. M., immature). DEPT. ICA: Bahia de la Independencia, Cerro Quemado, *Weberbauer* 7958, August 5, 1927 (F. M., photo in G., type collection of *Spergularia laciniata* Baehni & Macbride, type not seen). DEPT. AYACUCHO: Prov. Lucanos: between Sancos and Chaviña, *Raimondi* 10119, September, 1863 (B., sepals equal to the capsule). Dept. unknown: Lomas de Capac, Cerca de Chala, *Raimondi* 10179, November, 1863 (B., immature). DEPT. AREQUIPA: Prov. Camaná: Atiquipa, *Raimondi* 12989 (B., sepals equal to or slightly shorter than the capsule, leaves fleshy). Prov. Arequipa: 8400 ft. alt., Yura, *R. S. Williams* 2560, August 10, 1901 (U. S., N. Y., K., capsule exceeding the sepals); in quarries at the foot of Mt. Misti, Arequipa, *Stuebel* 79, February 15, 1877 (B., photo in G., type of *Tissa Stuebelii* Hieron., capsule shorter than the calyx (6 mm.)); dry gravelly river bed, 2500–2600 m. alt., above Arequipa, *Pennell* 13156, April 7–16, 1925 (G., U. S., N. Y., F. M., seeds not papillose); on rocky slopes (2800–2900 m. alt.) above Arequipa, *Pennell* 13247, April 6–16, 1925 (G., U. S., N. Y., F. M., immature); 8000–9000 ft. alt., Arequipa District, *D. Stafford* 354, April, 1934 (K., immature), local name “Estrellita de Cerro”; ravines, Pampa on southern slopes of Mt. Chachani (3050 m. alt.), north of Arequipa, *Hinkley* 10, March, 1920 (G., U. S., F. M., immature); 7600 ft. alt. Arequipa, *G. H. H. Tate* (Ladew Exped.) 1197, June, 1926 (N. Y.). DEPT. TACNA: Prov. Tacna: Alto de Tacora, *Juan Isern* (Comision Cientifica de Pacifico) 2277, June 22, 1863 (F. M.). CHILE: PROV. TARAPACÁ: Dept. Tarapacá: 3500–3800 m. alt., Cord. Quebrada de Quipisca, Noasa, *Werderman* 1841, March, 1926 (B., immature, but stamens 10 and style 2.5 mm. long and almost entirely united); between Jaina and Chasmisa, *F. Philippi* (Santiago, TYPE, photo. in G., immature). Prov. unknown: Paychama (3800 m. alt.) *Troll* 3161, March 9, 1927 (B., immature but sepals sometimes 10 mm. long, style united nearly to the apex (2.5 mm. long) and the stamens 10).

This species varies a great deal in comparative length of sepals and capsule. It also varies from a long-noded, sprawling habit, with filiform leaves, to a shorter-noded, more erect habit, with fleshy leaves (*Raimondi* 12989 and 10179). One plant (*Pennell* 13156) has non-papillose seeds but it matches many papillose-seeded plants in habit and all important characters. Occurrence of both types of seeds is another example of a phenomenon common to many of the species of *Spergularia*.

Hieronymus, in his description of *Tissa Stuebelii*,<sup>1</sup> says *S. fascicu-*

<sup>1</sup> Hieron. in Engler, Bot. Jahr. xxi. 308 (1895).

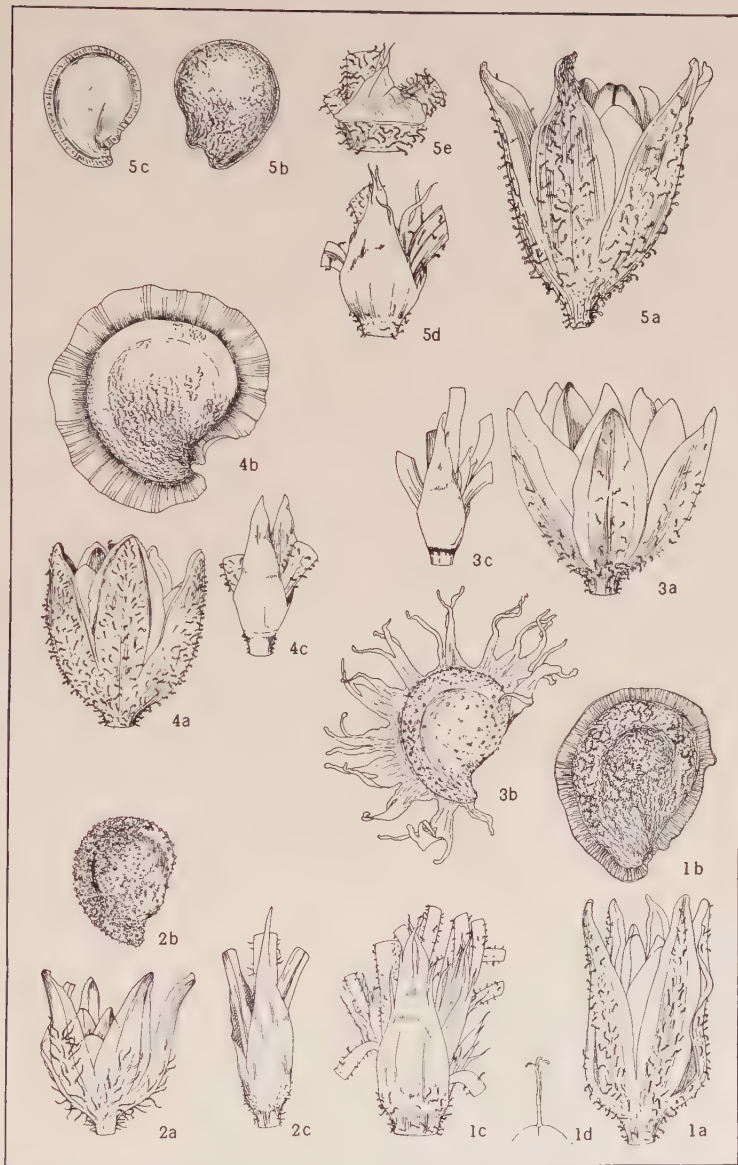
*lata* Philippi differs from his species in having a covering of short, crowded, erect hairs and a shorter calyx, 5 mm. in length. The type of *T. Stuebelii* is itself covered with pubescence. Since Hieronymus did not have many collections to study, he could not have known that the sepals may vary greatly in length.

Macbride,<sup>1</sup> in his key to the Spergularias of Peru, says *S. laciniata* has the lowest internodes slightly shorter than the leaves, and stipules fimbriate to one half their length, as contrasted with *S. Stuebelii* which has the lowest internodes much exceeding the leaves and the stipules lacerate only above. The length of the internode as compared with that of the leaves is never a diagnostic character in the genus. In this species the stipules vary greatly in depth of laceration, with no supporting characters nor geographic range to separate the extremes.

It is unfortunate that all the Chilean specimens are immature, but the flowers all have 10 stamens and the same length and type of style as the Peruvian specimens. The habit, stipules, and leaves are similar.

18. *S. ANDINA* Rohrb. (PLATE 593, FIGS. 2a-2c and MAP 14). Prostrate perennial: *caudex* bearing many crowded, slender stems, usually 10-20 or more, 2-8 cm. long; *internodes* of stem below the inflorescence 3-10 mm., usually 6-10 mm. long, less than 1 mm. in diameter: *leaves* not fascicled, mucronate, linear-filiform, glabrous, 7-15 mm. long, 0.4-0.8 mm. wide; *stipules* triangular-acuminate, 3-6 mm. long, connate from the base for 1-2 mm.: *inflorescence* compact and leafy, not sharply differentiated from the vegetative parts, *few-flowered*, the *internodes* shorter, 2-5 mm. long; *bracts* foliaceous, nearly as long as lower leaves: *sepals* lanceolate, with heavy, spreading, glandular pubescence on the lower half and without curving tips, hooded at the summit, 3.5-5 mm. long; *petals* broadly ovate, white or pink-tinged, 2-4 mm. long, 1-1.8 mm. shorter than the sepals; *stamens* 10; *styles* 3, always separated to the base: *mature capsules* 3-4 mm. long, exceeded by the calyx by as much as 0.5-1.2 mm.: *fruiting pedicels* very short, 0.5-2.5 mm. long: *seeds* brown, rounded at the summit, covered with deep, close, vermiform sculpture and large, cup-shaped, brown, glandular papillae, giving the surface an incrustated appearance, 0.6-0.8 mm. long, not winged.—Linnaea, xxxvii. 234 (1871-1873); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 629 (1937).—SOUTH AMERICA: in the Andes of Peru and Bolivia of the region of Lake Titicaca, 3850-4100 m. alt. PERU: DEPT. PUNO: Azangaro, Lechler 1772, June, 1854 (K. TYPE; B.); Weberbauer, 456 February 28, 1902 (B.). BOLIVIA: DEPT. LA PAZ: Achacache, Prov. Omasuyos, reg. alp., 3950 m.,

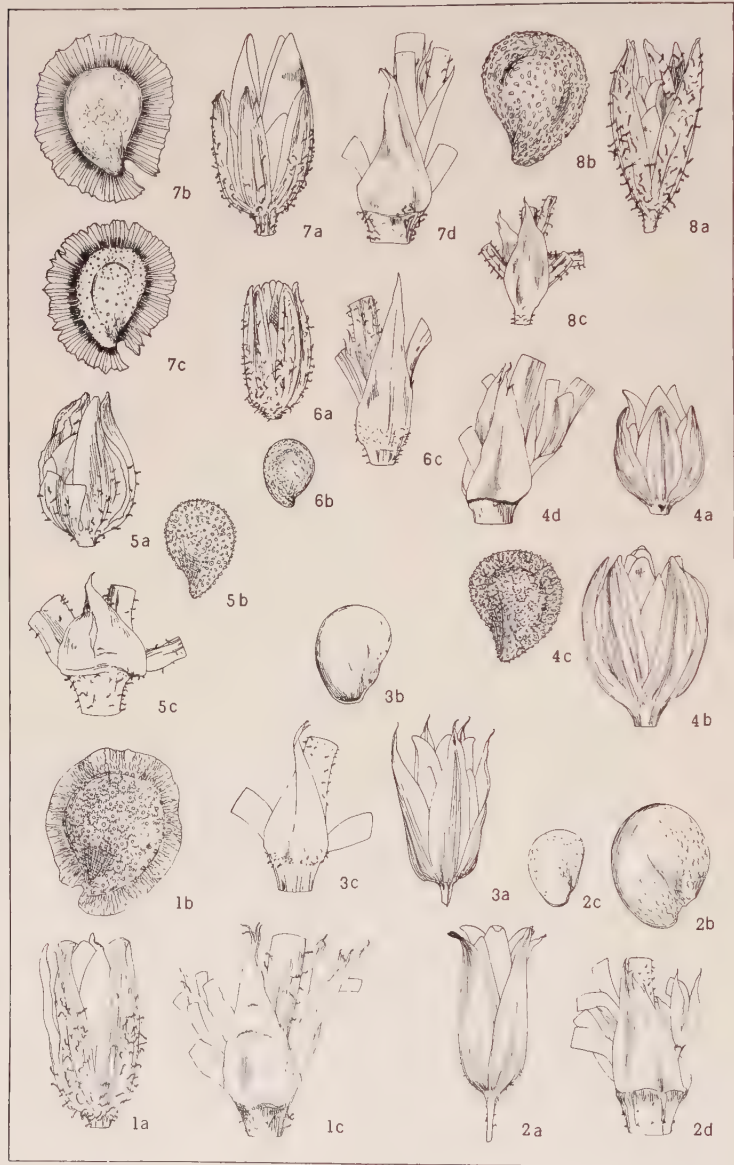
<sup>1</sup> Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, pt. ii. no. 2, 631 (1937).



SPERGULARIA: stipule, calyx, capsule and style  $\times 5$ ; seeds  $\times 25$ .

S. FASCICULATA, figs. 1a-1d. S. ANDINA, figs. 2a-2c. S. DEPAUPERATA, figs. 3a-3c. S. PISSISI, figs. 4a-4c. S. CREMNOPHILA, figs. 5a-5e.





SPARGULARIA: stipule, calyx and capsule  $\times 5$ ; seeds  $\times 25$ .  
*S. ABERRANS*, figs. 1a-1c. *S. STENOCARPA*, figs. 2a-2d. *S. DENTICULATA*,  
 figs. 3a-3c. *S. CERVIANA*, figs. 4a-4d. *S. FLORIBUNDA*, figs. 5a-5c. *S.*  
*PYCNANTHA*, figs. 6a-6c. *S. VILLOSA*, figs. 7a-7d. *S. CONFERTIFLORA*, figs.  
 8a-8c.

Mandon 947 (Geneva; photo. and fragm. F. M.); La Paz, *Buchtien* 594, March, 1910 (N. Y., U. S., Leiden) and 594, February 20, 1907 (U. S.).

Rohrbach with his description of this species cites three different collections, *d'Orbigny* 1499, *Mandon* 947, and *Lechler* 1772, from which I choose *Lechler* 1772 as the type. The *d'Orbigny* specimen, which I have not seen, came from Potosi and, if correctly identified, would extend the range much farther south.

19. *S. DEPAUPERATA* (Gay) Rohrb. (PLATE 593, FIGS. 3a-3c and MAP 15). *Prostrate perennial forming cushions: caudex* bearing many persistent stems, branching repeatedly at each growing season, 5-16 cm. long: *internodes of stem below the inflorescence very short*, 1-7 mm. long: *leaves* fascicled or not, linear-filiform, strongly mucronate, glabrous or sparsely glandular-pubescent, 4-20 mm., usually 7-13 mm. long, about 0.5 mm. wide; *stipules* triangular-acuminate, 2.5-6.5 mm. long: *inflorescence* open, few-flowered, sharply differentiated from lower parts with foliaceous bracts minute or wanting and internodes glandular-pubescent, 6-14 mm., usually 8-12 mm. long: *sepals* ovate-lanceolate, often distinctly fleshy, densely glandular-pubescent, scarious-margined, 4-5.5 mm. long; *petals* white, ovate, 4-6 mm. long, equal to or exceeding calyx by as much as 1 mm.; *stamens* 6-10; *styles* 3, 0.6-1.4 mm. long, united or divided partially or completely to the base: *mature capsules* 4.8-5.5 mm. long, equal to or slightly exceeding the calyx by as much as 0.5 mm.: *fruiting pedicels* filiform, usually glandular-pubescent, reflexed or not, the lower 6-15 mm. long: *seeds* light brown, rounded in outline, surface lightly roughened or pebbled in casual vermiform pattern, covered with regularly spaced, glandular hairs branched at the tips, 0.8-1 mm. long, surrounded by strap-like appendages, 0.3-0.6 mm. wide, made by deep lacerations of a papery wing.—*Linnaea*, xxxvii. 231 (1871-1873). *Arenaria depauperata* Gay, *Fl. Chile*, i. 270 (1845). *Lepigonum depauperatum* (Gay) Kindberg, *Synop. Lepig.* 11 (1856) and *Mon. Lepig.* 25 (1863). *L. grandiflorum* Kindberg, l. c. 34, t. 3, fig. 22 (1863). *S. grandiflora* (Kindb.) Rohrb. in *Linnaea*, xxxvii. 235 (1871-73). *S. depauperata* Philippi in *Anal. Univ. Chile*, lxxxi. (Pl. Nuevas Chil.) 765 (1892), in *obs.*, new combination based on *Arenaria depauperata* but with no reference to literature. *S. tenella* Philippi, l. c. 766 (1892). *S. Rengifo* Philippi, l. c. 769 (1892). *Tissa depauperata* (Gay) Reiche, *Fl. Chile* i. 200 (1896). *T. depauperata* var. *tenella* (Philippi) Reiche, l. c. *S. depauperata* var. *tenella* (Philippi) Hauman & Irigoyen in *Anal. Mus. Nac. Hist. Nat. Buenos Aires*, xxxii. 191 (1923), nom. in synonymy.—SOUTH AMERICA: in the Andes of central Chile and adjacent Argentina in the vicinity of the international boundary from the province of Aconcagua, Chile, south to the province of Rio Negro, Argentina. CHILE: PROV. ACONCAGUA: Uspallata Pass der Chilenischen Hochcordillere, Juncal, in Felsspalten, *Buchtien* 1132, February 13, 1903 (G., U. S., B.). PROV. SANTIAGO: in monte S. Pedro Nolasco,

32 m. s. m., *Carlos Rengifo* (Santiago, photo., fragment and seed in G., type of *Spergularia Rengifoii* Philippi)? PROV. NUBLE: near Ternias, Chillan, *F. Deltor* 2066, February 15, 1931 (G.); Cordillera von Chillan, *Felsen* 142, April 19, 1925 (B.); rupium fissuris Pico de Pilque, Andes de Antuco, *Pöppig*, 1828<sup>1</sup> (B., Geneva (photo in F. M.), F. M.; one of the Berlin sheets is marked *Lepigonum grandiflorum* (Poepp.) by Kindberg); without locality, Gay (G., type collection, type in Paris<sup>2</sup>). PROV. CAUTIN: Cerro Castillo, valle Malaco, Anden Valdivia, *Neger*, April, 1897 (B.). Chile, without locality or date: *Bridges* (B.); *Poeppig* (Leiden). ARGENTINA: PROV. RIO NEGRO: crevices of rocks, alt. 770 m., cushion-forming, Gobernacion Rio Negro, bridge over Rio Niri Huau, near San Carlos de Bariloche, *James West* 4770, December 15, 1935 (G., U. C.). PROV. NEUQUEN: growing in the driest rocks, 4500 ft., Liu Cullin, Gob. de Neuquen, *H. F. Comber* 304, December 12, 1925 (K.).

It is difficult to say who is the real author of the name *depauperata*. The label of the type collection in Gray Herbarium has *Arenaria depauperata* Naud. and Kindberg and Reiche both attribute it to Naudin. However, Gay must be considered the author since there is no author cited at the end of the "Cariofilieas" in Gay, Flora Chile, as there is after the "Elatineas," the next family treated.

The name *Lepigonum grandiflorum*, used by Kindberg in 1863 (see Mon. Lepig.) for the *Pöppig* collection, has its source in manuscript and herbarium names of *Pöppig* and Fenzl.<sup>3</sup> Since the *Pöppig* plants have no mature fruit, Kindberg, using the capsules and seeds as his fundamental key-characters, did not notice the almost exact similarity of *L. grandiflorum* and *L. depauperatum*, which was based upon the *Gay* collection, also immature, and kept up both species. In 1871-73, Rohrbach also kept both species but did not have the *Gay* collection and expressed his ignorance of *S. depauperata*.

The type specimens of both *S. tenella* and *S. Rengifoii* of Philippi are almost exact matches for the *Gay* collection.

20. *S. PISSISI* (Philippi) I. M. Johnston (PLATE 593, FIGS. 4a-4c and MAP 16). *Perennial, forming large mats, 7-13 cm. high; new stems branching from nodes of the old; internodes of stem below the inflorescence very short, glabrous or covered with very short glandular pubes-*

<sup>1</sup> Poeppig was in the region of Antuco, Chile, only from October, 1828, to March, 1829 (Pöppig & Endl., Nov. Gen. & Sp. I. Prol. iii. 1835). Therefore "1830," given on the Geneva specimen can not be the date of collection. It presumably is the date of receipt.

<sup>2</sup> Kindb. Mon. Lepig. 26 (1863), says this collection is in Paris. I have not examined it but assume that it is the same as the *Gray* specimens.

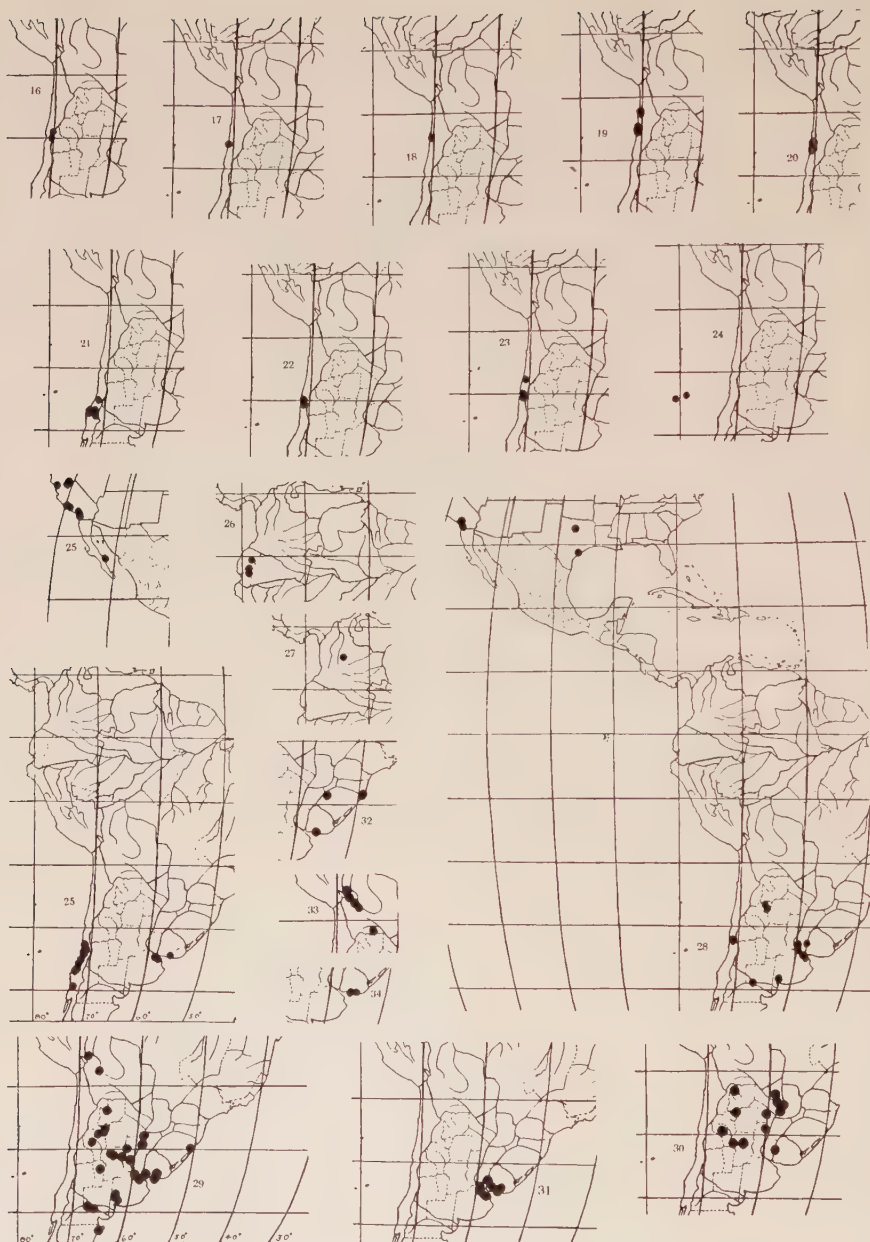
<sup>3</sup> Mus. Bot. Berol. has a specimen which was marked by Fenzl as *Spergularia grandiflora* Poepp. (1835), and by Kindberg as *Lepigonum grandiflorum*.



cence, *soft with a corky appearance*, 1.5–7 cm. long, 0.4–1.5 mm. in diameter: *leaves* fleshy, mucronate, fascicled, densely glandular-pubescent, 2–7 mm. long, 0.8–1 mm. broad; *stipules* narrowly lanceolate, not attenuate, not erose, white, silvery, 3–5.4 mm. long: *inflorescence* only one- or two-flowered: *sepals* fleshy, heavily glandular-pubescent, often purple-tinged at the margins, 4–5.4 mm. long; *petals* white, ovate, 3.6–4.5 mm. long, 0.4–1.4 mm. shorter than the calyx; *stamens* 10; *styles* 3, united about two-thirds of their length, 1–1.8 mm. long: *mature capsules* 5.4 mm. long, 0.4 mm. longer than the calyx: *fruiting pedicels* filiform, densely glandular-pubescent, 3–5 mm. long, probably reflexed when mature: *seeds* dark brown with a silvery tinge, rounded in outline, delicately sculptured in closely interwoven, vermiform pattern, not papillose,<sup>1</sup> 1 mm. long, surrounded by a narrow, scarious, entire-margined wing, 0.1 mm. wide.—Revist. Chil. Nat. xxxiii. 26 (1929). *Arenaria Pissisi* Philippi in Linnaea, xxxiii. 20 (1864). *Tissa Pissisi* (Philippi) Reiche, Fl. Chile, i. 200 (1896).—SOUTH AMERICA: in the Cordilleras of Chile only in the provinces of Atacama and Coquimbo at about 4000 m. alt. CHILE: PROV. ATACAMA: Dept. Vallenar: on gravelly, sod-covered bank of Laguna Chica, ca. lat. 28° 48' S., long. 69° 51' W. (about 3800 m. alt.), Johnston 5952, January 6–7, 1926 (G.); about small vegas below pass on west slope of Cerro Negro, in gravel, mats becoming over a meter broad, Quebrada Alfalfa (Q. de los Pozos), ca. lat. 28° 52' S., long. 69° 49'–54' W. (ca. 4000 m. alt.), Johnston 5985, January 7–8, 1926 (G., U. S.); Cordillera Laguna Chica (alt. ca. 4000 m.), Werdermann 255, January, 1924 (G., U. S., U. C.). PROV. COQUIMBO: Dept. Elqui: Baños del Toro, Volkmann 18  $\frac{6}{9}$  (Santiago, TYPE, photo. in G.); Baños del Toro, Reed (K.); Baños del Toro F. Philippi 171 (Santiago, photo. in G., agrees with the Kew specimen); 3600 m. alt., Baños del Toro, Valle del Rio Toro, Cordillera de Elqui, *Espinosa*, February 26, 1938 (G., the only collection with mature seeds).

21. *S. CREMNOPHILA* I. M. Johnston (PLATE 593, FIGS. 5a–5e and MAP 17). Perennial: *root* very heavy, ligneous, as much as 1 cm. thick: *caudex* well developed, bearing many diffuse stems, 13–30 cm. long; *internodes below the inflorescence* heavily glandular-pubescent, 6–15 mm. long, 0.7–1.4 mm. in diameter: *leaves* fleshy, mucronate, glabrous or sparsely glandular-pubescent, fascicled or not, 6–18 mm. long, 1–3 mm. wide: *stipules* broadly lanceolate, variable in length as compared to width, erose at the apex, 1.6–5 mm. long: *inflorescence* a lax leafy cyme; *internodes* densely glandular-pubescent, the lowest 7–20 mm. long, 0.4–1 mm. in diameter; *bracts* foliaceous below, minute above, 1–11 mm. long, glabrous or glandular-pubescent: *sepals* ovate-lanceolate, densely glandular-pubescent, 5–8 mm. long; *petals* white, ovate, 4.4–6 mm. long, equal to the calyx or as much as 2 mm. shorter;

<sup>1</sup> This does not mean that the seeds may never be papillose. The description is based upon the single mature collection known, sent to me by Sr. Marcial R. Espinosa of the Museo Nacional of Santiago, Chile.



Ranges of, 16, *SPERGULARIA PISSISI*; 17, *S. CREMNOPHILA*; 18, *S. ABERRANS*; 19, *S. STENOCARPA*; 20, *S. DENTICULATA*; 21, *S. CERVIANA*; 22, *S. FLORIBUNDA*; 23, *S. PYCNANTHA*; 24, *S. CONFERTIFLORA*; 25, *S. VILLOSA* (in 2 sections but not showing Oregon station); 26, *S. SPRUCEANA*; 27, *S. COLOMBIANA*; 28, *S. PLATENSI*; 29, *S. RAMOSA* (three additional stations farther south, in Terr. Santa Cruz); 30, *S. RAMOSA* var. *DIFFUSA*; 31, *S. LEVIS* (an additional station farther south, in Terr. Santa Cruz); 32, *S. GRANDIS*; 33, *S. PAZENSIS*; 34, *S. RUPESTRIS*.

*stamens* 8–10; *styles* 3, separated to the base or united at most for one-half their length, 0.6–2 mm. long; *mature capsules* 5–6.6 mm. long, equal to the calyx or as much as 2.4 mm. shorter; *fruiting pedicels* filiform, densely glandular-pubescent, spreading but not reflexed, the lowest 8–22 mm. long; *seeds* brown, with the surface either dull and sculptured in interwoven, vermiform pattern with occasional small papillae (as in the type), 0.8–1 mm. long, or lustrous and smooth with a suggestion of delicate, vermiform tracery,<sup>1</sup> 0.7–1.2 mm. long, surrounded by a hard, brown, narrow rim which is often sculptured in vermiform ridges.—Contrib. Gray Herb. lxxxv. 41 (1929).—SOUTH AMERICA: grows in coastal Chile in the province of Antofagasta near the Atacama line. CHILE: PROV. ANTOFAGASTA: Dept. Taltal: crevices at head of high fog-bathed sea-cliff near Aguada Cachina, waterhole in Quebrada Cachina, ca. 6 km. inland from Caleta Esmeralda, ca. lat. 25° 53' S., Johnston 5683, December 15, 1925 (G. TYPE, U. S., F. M., seeds dull, sculptured, papillose, 0.8–1 mm.); prostrate on exposed foggy slopes about summit of Cerro de la Cachina, near Aguada Cachina, Johnston 5684, December 15, 1925 (G., U. S., seeds glossy, 1–1.2 mm. long); decumbent on moist, fog-bathed, gravelly slopes at head of Quebrada, above the waterhole, near Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, ca. lat. 26° 2' S., Johnston 5821, December 18, 1925 (G., U. S., F. M., seeds small, lustrous, 0.7–0.8 mm. long, stipules much shorter than in the previous two collections).

These three collections show great variability in type of seed (see citations), length of stipule, type of leaf, and length of sepal in comparison with petals and capsule. The seeds seem too widely different to belong to the same species but no other character can be found to support setting them apart. Glossy-seeded plants have both extremes of stipules and both extremes of leaves and all types of sepals.

Further collections are needed for more accurate understanding, either for support of this treatment or as evidence for some other.

22. *S. ABERRANS* I. M. Johnston (PLATE 594, FIGS. 1a–1c and MAP 18). Perennial: *caudex* bearing many diffuse stems 20–40 cm. long; *internodes of stem below the inflorescence* glandular-pubescent, 10–35 cm. long, 0.6–1.2 mm. in diameter; *leaves* fascicled, mucronate, glabrous, 15–30 mm. long, 0.4–1 mm. wide; *stipules* broadly lance-acuminate, lacerate at the apex, 5–6 mm. long; *inflorescence* a short, open cyme, few-flowered, glandular-pubescent throughout; the *lowest internodes* 12–30 mm. long, 3–4 mm. in diameter; *bracts* 2–6 mm. long, glandular-pubescent; *sepals* linear, acute-tipped, glandular-pubescent, 4.8–5.6 mm. long; *petals* ovate, white, nearly equal to the

<sup>1</sup> This looks as though a seed like those of the type but without papillae had been heavily varnished, leaving only the slightest suggestion of what might have been deep sculpture!



calyx, 4.6–5.4 mm. long; *stamens* 5; *styles* 3, united when young, dividing to at least half their length as flower matures, 1–1.8 mm. long; *mature capsules* 4–5.4 mm. long, equal to or slightly exceeded by the calyx; *fruiting pedicels* not reflexed, filiform, 10–15 mm. long; *seeds* dark, sepia-brown, rounded in outline, surface sculptured in interwoven, areolar, vermiform pattern, covered with dark brown papillae, 0.8–0.9 mm. long, surrounded by a narrow, dark brown wing, which is also sculptured in vermiform pattern next to the seed, at most 0.1 mm. wide.—Contrib. Gray Herb. lxxxv. 147 (1929).—SOUTH AMERICA: only in the northern part of Chile in the province of Antofagasta. CHILE: PROV. ANTOFAGASTA: Dept. Antofagasta: in rock crevices, base of hills just southeast of La Chimba, Antofagasta, Johnston 3631, October 19, 1925 (G., TYPE); Antofagasta, Jaffuel 1136, October 29, 1930 (G.). Dept. Tocopilla: Tocopilla, Jaffuel 1007, October 27, 1930 (G.), probably, but no fruit or flowers.

*S. aberrans* was so named because of its “reduced androecium and united styles.” This condition was considered by Dr. Johnston as atypical of the genus. However, five stamens are to be found in many species, such as *S. marina*, *S. canadensis*, *S. denticulata*, *S. stenocarpa*, *S. floribunda* and *S. platensis*; and united styles may occur in the following species: *S. fasciculata*, *S. Pissisi*, *S. cremnophila*, *S. stenocarpa*, *S. rupestris*, and *S. depauperata*.

23. *S. STENOCARPA* (Philippi) I. M. Johnston (PLATE 594, FIGS. 2a–2d and MAP 19). Annual or perennial: *caudex* bearing 3– $\infty$  diffuse stems, 9–35 cm. long, usually many, which in turn may branch several times; *internodes of stem below the inflorescence* 8–40 mm., usually 20–30 mm. long, 0.5–1.2 mm. in diameter, nearly glabrous or usually covered with short glandular pubescence; *leaves* glabrous, fasciated, mucronate, 11–40 mm., usually 15–30 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, acuminate, slightly lacerate at the tip, 2.5–5 mm., usually 3–4 mm. long; *inflorescence* an open, leafy, compound cyme; *internodes* shortly glandular-pubescent, the lowest 8–30 mm., usually 13–25 mm. long, 0.3–0.8 mm. in diameter; *bracts* foliaceous below, minute above; *sepals* linear-attenuate, the outer occasionally mucronate, glabrous, 3–4.6 mm. long; *petals* white, ovate, 2.8–3.2 mm. long; *stamens* 5; *styles* 3, united when young, separating at least half their length or nearly to the base as flower matures, 0.8–1 mm. long; *mature capsules* 3.2–4.8 mm. long, equal to or exceeding the calyx by as much as 0.2–0.8 mm.; *fruiting pedicels* not reflexed, filiform, glandular-pubescent, the lowest 6–12 mm., usually 9–11 mm. long; *seeds* brown, lustrous, smooth or slightly roughened with a suggestion of sculpture in vermiform pattern, 0.4–0.7 mm. long, not winged but sometimes with a very narrow, brown rim.—Contrib. Gray Herb. lxxxv. 41 (1929). *Arenaria stenocarpa* Philippi, Fl. Atac. 10 (1860) and Viage Des. Atac. 19, 184 (1860). *S. Larrañaga* Philippi in Anal. Univ.

Chile, lxxxi. 767 (1892). *S. Borchersi* Philippi in Anal. Univ. Chile, lxxxi. 769 (1892). *Tissa Borchersi* (Philippi) Reiche, Fl. Chile, 199 (1896).—SOUTH AMERICA: known only on the coast of Chile in the province of Antofagasta. CHILE: PROV. ANTOFAGASTA: Dept. Tocopilla: Tocopilla, *Jaffuel* 1017, October 27, 1930 (G., seeds large but plant in poor condition); Cobija, *Gaudichaud*, July, 1836 (G., seeds large, only scraps of a plant). Dept. Taltal: prostrate on gravelly slope near Perales, vicinity of Paposo, Quebrada de Guanillo, *Johnston* 5604, December 8, 1925 (G., seeds large, spec. marked "the large plant has the calyx and flower-size of the type of *S. Larrañaga* Ph!" by Johnston); decumbent on rocky seaward slope between Quebrada San Ramon and Poso Malo, *Johnston* 5177, November 28, 1925 (G.); prostrate annual on gravelly bench just back of beach, petals white, Caleta de Hueso Parado, vicinity of Taltal, *Johnston* 5162, November 26, 1925 (G., U. S., outermost sepals mucronate but capsule and habit typical); Hueso Parado, *Philippi* (Santiago, TYPE, photo. and fragment in G.); Taltal, about 50 m. alt., *Werdermann* 799, October, 1925 (G., U. S., B., F. M., Cal. Acad., U. C., outermost sepals mucronate but habit typical); dry hillside about 8 km. south of town in Quebrada de Infielos, vicinity of Taltal, *Johnston* 5641, December 13, 1925 (G., U. S., plant small, more compact than any of the preceding); Quebrada de Taltal, *Montero* 2897, September 10, 1936 (G.); Puerto Oliva near Taltal, *Borchers* 2286, 1887 (Santiago, photo. and fragment in G., type of *Spergularia Borchersi* Philippi); Breas, *Larrañaga*, 1888 (Santiago, photo. and fragment in G., type of *Spergularia Larrañaga* Philippi, identification not absolutely positive).

There is a great seed variation, as will be noticed in the figure and citations. It is possible that, with many more collections, the larger-seeded plants might be found to have a more northerly range and enough constant characters to set them apart taxonomically. At present it seems best to include them all in *S. stenocarpa*.

The type of *Spergularia Larrañaga* Philippi is immature but, since its sepals are only very slightly mucronate, it is here included, although with more collecting plants like it may possibly be found to belong to *S. denticulata*. The fact that it was collected between the general ranges of the two species is significant. Its immaturity prevents any sure classification.

24. *S. DENTICULATA* Philippi (PLATE 594, FIGS. 3a–3c and MAP 20). Annual: *caudex* bearing 5–∞ diffuse, branching stems 4–17 cm. long; *internodes of stem below the inflorescence* few in number, covered with short, glandular pubescence, 5–24 mm., usually 10–20 mm. long, 0.4–1 mm. in diameter; *leaves* glabrous, mucronate, *usually not fascicled*, 8–20 mm. long, 0.8–1.4 mm. wide; *stipules* broadly lanceolate, 2.2–3.8 mm. long, only slightly lacerate at the tip; *inflorescence* a crowded

compound cyme; internodes covered with short, glandular pubescence, the lowest 5–18 mm. long, 0.3–0.9 mm. in diameter; bracts foliaceous, 3–12 mm. long; sepals linear, glabrous, usually with attenuate, scarious or setaceous apices, sometimes blunt in the inner sepals, 4–4.8 mm. long; petals white, ovate, 2.6–3.2 mm. long; stamens 5; styles 3, separated to the base, 0.6–0.8 mm. long; mature capsules 3–4 mm. long, exceeded by the calyx by as much as 0.4–1.6 mm., usually 0.8–1.2 mm.; fruiting pedicels not reflexed, sparsely glandular-pubescent, filiform, 2–9 mm. long; seeds brown, dull with a smooth or slightly huddled surface, 0.5–0.6 mm. long, not winged but often surrounded by a very narrow, brown rim. —Anal. Univ. Chile, lxxxi. 769 (1892). *Arenaria denticulata* Philippi, Fl. Atac. 10 (1860). *Tissa denticulata* (Philippi) Reiche, Fl. Chile, i. 199 (1896). —SOUTH AMERICA: only on coast of Chile in the provinces of Antofagasta and Atacama. CHILE: PROV. ANTOFAGASTA: Dept. Taltal: one plant on dry rocky slope just north of summit of Porto Mina Carola, Sierra Esmeralda, along trail between Posado Hidalgos and Quebrada Cachina via Portezuelo de Mina Carola, Johnston 5672, December 14, 1925 (G.); common on gravelly or sandy soil, region about Aguado Cachina (waterhole in Quebrada Cachina ca. 6 km. inland from Caleta Esmeralda), Johnston 5737, December 14–15, 1925 (G., U. S., F. M.); dry sandy floor of quebrada about water-hole, vicinity of Aguada Grande ("Cachinal de la Costa" of Philippi), near Antofagasta-Atacama provincial boundary, Johnston 5822, December 16–18, 1925 (G.); Cachinal de la Costa, Philippi, December, 1853 (Santiago, TYPE, photo. and fragment in G.). PROV. ATACAMA: Dept. Chañaral: on dry sandy slope ca. 1.5 km. above the caleta, vicinity of Caleta Pan de Azucar, Johnston 5833, December 18, 1925 (G.); sandy plain near sea, prostrate herb with white flowers, not common, vicinity of Puerto de Chañaral, hills back of El Barquito, Johnston 4754, October 28–29, 1925 (G., U. S.).

This species is similar to *S. stenocarpa* in leaves and stipules and in the repeatedly branching stems. Both have compound cymes and five stamens. The seeds of both species are of the same size and shape and in both have narrow, brown rims. The two species, however, differ in many ways. *S. denticulata* has usually shorter stems with shorter internodes, a compact instead of a loose cyme, capsule shorter than calyx instead of equalling or longer than the calyx, and shorter styles divided completely to the base. *S. denticulata* always has dull seeds; *S. stenocarpa* always has lustrous ones. Although *S. denticulata* nearly always has strongly mucronate sepals, occasionally the inner are blunt at the apex. Likewise *S. stenocarpa*, although it usually has blunt sepals, occasionally has the outer mucronate. Many more collections of these two species are needed, and perhaps cytological work as well, in order to understand thoroughly the significance of those plants with both types of sepals.



25. *S. CERVIANA* (Cham. & Schlecht.) G. Don (PLATE 594, FIGS. 4a-4d and MAP 21). Perennial: stems at least 14-17 cm. tall;<sup>1</sup> *internodes of stem below the inflorescence* 5-23 cm. long, 0.7-1.2 mm. in diameter; *leaves* fascicled, shortly mucronate, filiform, glabrous or shortly and sparsely pubescent, 13-35 mm. long, 0.6-0.8 mm. broad; *stipules* broadly lanceolate-acuminate, 2-6 mm. long; *inflorescence* a compound cyme, glabrous throughout or only shortly and sparsely pubescent, *usually crowded because of the many capsules and short internodes*; *internodes* slender, the lowest 1-21 mm. long, 0.4-0.6 mm. in diameter; *bracts* foliaceous, lacking or as much as 15 mm. long; *sepals* linear, blunt-tipped, glabrous, 2.6-4.5 mm. long; *petals* white, ovate, 2-4 mm. long, equal to or as much as 0.5 mm. shorter than the sepals; *stamens* 10; *styles* 3, separated to the base, 0.6-0.8 mm. long; *mature capsules* 3.2-4.2 mm. long, equal to or as much as 0.4 mm. shorter than or 0.8 mm. longer than the calyx; *fruiting pedicels* filiform, *not reflexed, glabrous*, the lowest 4-12 mm. long, 0.2 mm. in diameter; *seeds* 0.6-0.8 mm. long, dark brown, pyriform, silvery, *deeply sculptured in closely interwoven, vermiform pattern, covered with large, light brown, glandular papillae, sometimes dark brown and more rigid on the flat sides of the seed, not winged*.—Gen. Hist. Dichl. Pl. i. 426 (1831). *Arenaria Cerviana* Cham. & Schlecht. in *Linnaea*, i. 52 (1826). *Spergula Cerviana* (Cham. & Schlecht.) D. Dietr. Syn. Pl. ii. 1598 (1840). *Lepigonum purpureum* var. *firmum* Kindb. Mon. Lepig. 33, t. 3, fig. 21 (1863). *Spergularia firma* (Kindb.) Rohrb. in *Linnaea*, xxxvii. 231 (1871-73). *Spergularia polyantha* Philippi in *Anal. Univ. Chile*, lxxxi. (Pl. Nuev. Chil.) 765 (1892).—SOUTH AMERICA: grows only in south-central Chile. CHILE: PROV. CURICO: Dept. ? : ca. 1500 m. Hacienda Monte Grande, *Werdermann* 1671, December, 1924 (B., seeds immature). PROV. NUBLE: Dept. Chillan: *Narcissus Briones*, 1887 (Santiago, photo. and fragment in G., type of *Arenaria polyantha* Philippi). Dept. Laja: in stony fields at Antuco, *Pöppig* 125, December (B., type of *Lepigonum purpureum* var. *firmum* Kindberg and marked by him in 1861); also *Pöppig* 804 (same collection, I think, Geneva, photo. in F. M.). PROV. CONCEPCION: Dept. Talcaguano: [Talcaguano, Feb. 13-Mar. 8, 1816],<sup>2</sup> *Chamisso* (B. TYPE, marked *Arenaria Cerviana* N.). Dept. Lautaro: Coronel, *A. W. Hill* 42, December, 1902 (K., seeds immature).

There is great variation in comparative lengths of capsule and calyx, as is shown in the illustration. However, there are too few collections known for an understanding of the significance of this variation. At present it seems best to include all these plants under one species, especially since all fruiting plants have similar seeds.

26. *S. FLORIBUNDA* (Gay) Rohrb. (PLATE 594, FIGS. 5a-5e and MAP 22). Perennial with a heavy ligneous root as much as 5 mm. thick:

<sup>1</sup> Most of the collections are rootless.

<sup>2</sup> Locality and date found in *Linnaea*, i. 10 (1826).

*caudex* well developed, nodose, bearing 8-∞ diffuse stems 3-13 cm. long; *internodes of stem below the inflorescence* glandular-pubescent, 2.5-20 mm. long, 0.3-0.8 mm. in diameter; *leaves* filiform, mucronate, glabrous or glandular-pubescent, usually not fascicled or if so with only 1 leaf in the axil, 4-20 mm. long, 0.4-0.8 mm. broad; *stipules* broadly lanceolate, acuminate, 2-3.8 mm. long; *inflorescence* a crowded cyme; *internodes* usually too crowded to measure or 1-5 mm. long; *bracts* foliaceous, minute, 2-5 mm. long; *sepals* linear, with broad, scarious margins, sparsely glandular-pubescent especially toward the base, 2.8-5 mm. long; *petals* white, ovate, 2.4-3.8 mm. long, as much as 1.2-2 mm. shorter than the calyx; *stamens* 3-5; *styles* 3, divided to the base, 0.7-1 mm. long; *mature capsules* spherical, 2.4-3.8 mm. long, equal to or as much as 0.4-1.2 mm. shorter than the calyx; *fruiting pedicels* filiform, glandular-pubescent, 1.2-2 mm. long; *seeds* 0.4-0.7 mm. long, black, pyriform, the surface sculptured in vermiform, arcular pattern and densely covered with short, coarse (sometimes partially rigid) brownish or blackish, glandular papillae, not winged.—*Linnaea*, xxxvii. 230 (1871 73). *Arenaria floribunda* Gay,<sup>1</sup> Fl. Chile, i. 269 (1845). *Lepigonum floribundum* (Gay) Kindb. Synop. Lepig. 5 (1856). *L. depauperatum* \**floribundum* (Gay) Kindb. Mon. Lepig. 26 (1863). *S. coquimbensis* Philippi in Anal. Univ. Chile, lxxxii. 763 (1893). *Tissa floribunda* (Gay) Reiche, Fl. Chile, i. 197 (1896).—SOUTH AMERICA: known only in coastal Chile in the province of Coquimbo. CHILE: PROV. COQUIMBO: Dept. La Serena: vicinity of La Serena, *Cl. Gay* (G., K., TYPE COLLECTION);<sup>2</sup> Punta de Teatinos, La Serena, *Werdermann* 1542, November, 1925 (B.), in part only; Cerro Penascudo, *Barros* 255, September 13, 1928 (G.). Dept. Coquimbo: vicinity of Coquimbo, *Jaffuel* 2671, September, 1931 (G.); Coquimbo, *Jaffuel* 1289, November 3, 1930 (G.); Coquimbo, *Reed* (K.); "El Faro," Coquimbo, *Montero* 2833, September 16, 1936 (G.); Coquimbo, *Philippi* 1951, September, 1885 (Santiago, photo. and fragment in G., type of *S. coquimbensis* Philippi). Dept. Ovalle: Steppe bei Cerillos west Ovalle, *Otto Berninger* 638, September 19, 1925 (B.).

*S. floribunda* is quickly recognized by its crowded cyme, spherical capsules and small, black, densely papillose seeds. The type of *S. coquimbensis* Philippi is an exact match for specimens of the type collection of *Arenaria floribunda* Gay.

27. *S. pycnantha*, spec. nov. (TAB. 594, FIG. 6a-6c). Perennis: caudice ramoso, caulibus 2-6 diffusis interdum divisis, 6-20 cm.

<sup>1</sup> Gay must here be considered the author, instead of Naudin as is usually thought, because, as previously stated, there is no author cited at the end of "Cariophylleas," as there is after the "Elatineas," and no later publication that I have been able to find states that Naudin did the work on the *Caryophyllaceae*. This is decided also in spite of the fact that Gay credited Naudin with the authorship on the labels of the type collections.

<sup>2</sup> Type not seen but is supposedly in the Muséum National d'Histoire Naturelle at Paris.

longis; internodiis caulis partis effloriferae dense villosoglandulosus, 6–25 mm. longis, 0.4–1.4 mm. crassis: foliis glabris vel villosoglandulosus, breviter mucronatis, fasciculatis, 7–30 mm. longis, 0.6–1.4 mm. latis: stipulis conspicuis, lanceolatis acuminatis, apice laceratis, 5–7 mm. longis: cyma composita, villosoglandulosa, propter internodium longum infra flores infimos alte supra reliquas partes plantae producta; internodiis infimis 1–15 mm. longis, 0.2–0.6 mm. crassis; bracteis foliosis 1.2–10 mm. longis: sepalis linearibus, margine late scariosis, villosoglandulosus, 3.6–4.6 mm. longis; petalis albis, ovatis, 2.4–3 mm. longis, sepalis 0.6–1.6 mm. brevioribus; staminibus 2–5; stylis 3, 0.6–0.8 mm. longis: capsulis maturis 3.2–4.2 mm. longis, sepalis aequantibus vel eis 0.8 mm. brevioribus: pedicellis fructiferis filiformibus, villosoglandulosus, haud reflexis, 2–7 mm. longis: seminibus 0.3–0.5 mm. longis, ferrugineis, lineis vermiformibus intertextis sculptis, fere laevibus vel tumulis prominentibus productis areolis, aliquando papillis parvis ferrugineis, haud alatis.—SOUTH AMERICA: coastal Chile, only in the provinces of Atacama and Coquimbo. CHILE. PROV. ATACAMA: Dept. Copaipe: Bandurrias, Giesse (B.); Desert of Atacama, Giesse 132, 1885–87 (N. Y., one plant only on the sheet, identical with the Bandurrias specimen); Vallenar, Barros 263, September 9, 1927 (G., not mature). Dept. Freirina: Huasco, Jaffuel 1164, November 2, 1930 (G., TYPE). PROV. COQUIMBO: Dept. La Serena: La Serena, Claude-Joseph 4461, October, 1926 (U. S.). Dept. Coquimbo: Guayacan, Philippi, November, 1864 (B.); Coquimbo, Montero 1850, September 26, 1934 (G.); Coquimbo, Rose 19316, October 11, 1914 (U. S., only part of sheet). Dept. Ovalle: Ovalle, Claude-Joseph 5197 & 5198, October, 1927 (U. S.). Dept. ? : Agosto, Jaffuel 3927, 1937 (G.). MAP 23.

28. *S. CONFERTIFLORA* Steud. (PLATE 594, FIGS. 8a–8c and MAP 24). Perennial with heavy root as much as 4 mm. in diameter; *caudex* elongate, bearing one to several *prostrate*, much branched stems 10–25 cm. long; *internodes below the inflorescence* glabrous or glandular-pubescent, 2–20 mm. long, 0.5–1.6 mm. in diameter; *leaves filiform, densely fascicled*, or with a small branch in the axil, shortly mucronate or abruptly acute, glabrous or sparsely glandular-pubescent, 7–30 mm. long, 0.3–0.7 mm. wide; *stipules lanceolate-acuminate*, 3.2–6 mm. long: *inflorescence* a loose, many-flowered cyme; *internodes filiform, glandular-pubescent*, the lowest 2–16 mm. long, 0.2–0.5 mm. in diameter; *bracts* small, becoming minute above, glandular-pubescent, 1–7 mm. long: *sepals* linear, glandular-pubescent, 4.8–6.2 mm. long; *petals* white, ovate, 3–5.6 mm. long, as much as 1.2–2.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base, 0.4–0.6 mm. long: *mature capsules slender*, 4–6 mm. long, equal to or as much as 0.8 mm. shorter than the calyx: *fruiting pedicels* erect, filiform, glandular-pubescent, the lowest 3–7 mm. long: *seeds* 0.6–0.7 mm. long, brown, rounded in outline, obscurely sculptured in interwoven, vermiform pattern, covered with papillae which may be round or elongate and slightly curved,<sup>1</sup> not

<sup>1</sup> Some seeds may have both kinds of papillae, others have entirely elongate ones.



winged.—Flora, 425 (1856); Philippi in Anal. Univ. Chile, lxxxi. (Pl. Nuevas Chile) 768 (1892); Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Arenaria rubra* sensu Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832), in part, including Juan Fernandez (spec. *Bertero*), excluding Valparaiso (*Bridges*), which is *S. villosa*,<sup>1</sup> non L. (1753). *Arenaria rubra* var. *polyphylla* Philippi in Bot. Zeitung, xiv. 642 (1856) (at least in part because of an annotated *Philippi* collection (K.) from Juan Fernandez but probably not as to Rancagua plants<sup>2</sup>). *S. campestris* 2. forma multicaulis stricta, etc. Rohrb. in Linnaea, xxxvii. 230 (1871–1873). *S. polyphylla* (Philippi) Rohrb. l. c. 232 (1871–73). *S. confertiflora* var. *polyphylla* (Philippi) Skottsberg, Nat. Hist. Juan Fernandez and Easter Is. ii. (Phan. Juan Fernandez) 121 (1922). *Tissa polyphylla* (Philippi) Reiche, Fl. Chile i. 197 (1896). *S. rubra* sensu Johow, Estud. Fl. Juan Fernandez, 118 (1896), non *Arenaria rubra* L. (1753). —SOUTH AMERICA: only on the Juan Fernandez Islands. CHILE: Juan Fernandez Islands: on sea cliffs, *Bertero* 1431, March, 1830 (K., TYPE COLLECTION);<sup>3</sup> Juan Fernandez, *Philippi*, 1861 (K., marked *polyphylla* in same manner as other *Philippi* labels, type collection of *Arenaria rubra* var. *polyphylla* *Philippi*?); Juan Fernandez, *Moseley* (Challenger Exped.), November, 1875 (K.); Juan Fernandez, *Hooker f.* (N. Y.); Masatierra, Punta San Carlos, C. & I. Skottsberg 123, January 9, 1917 (N. Y., marked *Spergularia confertiflora* Steud. by Skottsberg); Masatierra, Bahia de Padre, C. & I. Skottsberg 296 (U. S.).

This species is apparently endemic in the Juan Fernandez Islands. Many more collections are needed thoroughly to understand its variations and to determine whether there is any foundation for the reports of its occurrence on the mainland of Chile.

29. *S. VILLOSA* (Pers.) Camb. (PLATE 594, FIGS. 7a–7d and MAP 25). *Perennial* with a heavy ligneous central root; *caudex* well developed, branched, bearing 2–many, usually many, diffuse stems 9–30 cm. long; *internodes of stem below the inflorescence* usually glandular-pubescent, sometimes glabrous below, but always pubescent above, 3–40 mm. long, 0.4–1.7 mm. wide; *leaves* fascicled, filiform, mucronate, 10–40 mm. long, 0.3–1.2 mm. broad, usually glandular-pubescent; *stipules* broadly lanceolate, acuminate, occasionally, when small, deltoid, 2–8 mm. long; *inflorescence* a lax, many-flowered cyme, always glandular-pubescent, the *lowest internodes* 5–35 mm. long, 0.2–0.8 mm. in diameter; *bracts* usually minute, 1–7 mm. long, occasionally foliaceous, 8–15 mm. long; *sepals* linear-lanceolate, glandular-pubescent, 2.8–5.2 mm. long; *petals* white, ovate, 2.6–5 mm. long, usually 0.6–1.6 mm. shorter than the calyx; *stamens* 7–10; *styles* 3, separated to the base,

<sup>1</sup> The remaining collections cited were not seen by the author.

<sup>2</sup> Rancagua is on the mainland of Chile, whence the author has seen no collections of this species.

<sup>3</sup> Is the type at Paris? Flora, 402 (1856) note!

0.4–0.6 mm. long: *mature capsules* 4–6.5 mm., usually 5–6 mm. long, and 0.3–1.8 mm., usually 0.8–1.8 mm. longer than calyx: *fruiting pedicels* filiform, always glandular-pubescent, usually reflexed, though sometimes erect, the lowest 5–18 mm. long: *seeds* 0.4–0.65 mm., usually 0.5–0.6 mm. long, dark brown, almost black, pyriform, with small black papillae in regular pattern or smooth, occasionally with small raised places in the same pattern as the papillae, covered with very delicate, vermiform traceries in arcular pattern, with or without a scarious, white, *erose wing* 0.1–0.2 mm. wide, often with a brown zone next to the seed.—In St. Hilaire, Fl. Bras. ii. 178 (1829); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay) i. 93 (1901) in part (including references to *Spergula villosa* Pers. and *Lepigonum trachyspermum* Kindb. and localities given, excluding the description and reference to *S. villosa*  $\alpha$ . *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. lxi, fig. 1 (1872), which apply to *S. ramosa* and *S. rupestris*, *q. v.*); Buchtien, Contrib. Fl. Bolivia, pt. i. iii. (1910) (as to source of name but not as to plant cited, La Paz 448, which is *S. pazensis*); Macbride, Field Mus. Pub. Bot. xiii. (Fl. Peru) pt. ii. no. 2, 633 (1937) (as to source of name but not as to plants described, because of “seeds yellow,” and excluding reference, Mart. Fl. Bras. xiv. pt. 2, pl. 61, both of which probably apply to *S. ramosa*, *q. v.*). *Spergula villosa* Pers. Synop. i. 522 (1805); Steud. Nom. Bot. ed. 2, ii. 617 (1841). *Arenaria media* sensu Hooker & Arnott in Hooker, Bot. Misc. iii. 147 (1832), in part (including the collections from Valparaiso of *Cruickshanks* and *Cuming* 550, excluding collections Buenos Aires (*Gillies*) and Valparaiso (*Bridges*) both of which are *S. media*), non L. (1762); sensu Gay, Fl. Chile i. 267 (1845) (because a specimen collected by Gay in Chile is labeled *A. media* by him and is actually *S. villosa*), non L. (1762). *Lepigonum villosum* Fisch. & Mey. Ind. Sem. Hort. Petrop. iv. 15 (1837), *nomen nudum*. *L. villosum* (Pers.) Kindb. Synop. Lepig. 16 (1856). *L. glandulosum* Liebm. Ind. Sem. H. Haun. 21 (1853), not Kindb. Mon. Lepig. 16 (1863) (which is based upon an entirely different African plant, *Arenaria glandulosa* Jacquin, Hort. Schoenb. iii. 56, pl. 355 (1798). *Arenaria Berteroana* Philippi in Linnaea, xxviii. 673 (1856). *Spergularia remotiflora* Steud. in Flora, 425 (1856), probably synonymous, according to description (the collection cited, *Bertero* 811, was not seen by me); Philippi in Anal. Univ. Chile, lxxxi. 768 (1892). *S. rupestris* sensu Steud. in Flora, 424 (1856) (because the cited specimens, *Bertero* 810 & 58, are *S. villosa*) non Camb. (1829); sensu Philippi in Anal. Univ. Chile, lxxxi. 771 (1892), for same reasons as above, non Camb. (1829). *Lepigonum Liebmannianum* Lange, Ind. Sem. H. Haun. 2 (1859); Kindb. Mon. Lepig. 27 (1863). *L. arenarium* Kindb. Synop. Lepig. 13 (1856) (because he cites *Arenaria media* Gay and the Coquimbo, Gay, collection which is probably *S. villosa*—see citations); Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863); including the references, *S. villosa* Camb. and *A. media* Gay, and the collections, Coquimbo, Chile, Gay, probably, and

Talcahuano, *Pöppig*, and the left-hand plant and the seed with the erose-margined wing; and excluding the references, *S. grandis* Camb., *S. ramosa* Camb., *A. grandis* HBK. & DC., and the remainder of the figure and specimens cited, all of which apply to *S. grandis* and *S. ramosa*, *q. v.*). *L. arenarium* Kindb. var. *depressa* Kindb. Mon. Lepig. 17, t. i, fig. 4 (1863). *L. macrorhizum* (Rég.) Kindb. var. "seminibus alatis floribus paulominoribus," Kindb. Mon. Lepig. 22 (1863) (because coll. by *Pöppig*, Chile ad Concon, is *S. villosa*). *L. trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including the references, *S. villosa* Camb. and *Spergula villosa* Pers., and the collection, *Bertero*, Chile (B.) (cf. under citations); and excluding the citations, Montevideo, *Sello* and Maldonado, *Camb. & St. Hil.*, which are *S. ramosa* and *S. rupestris*, and the fig. 16, which is *S. ramosa*). *Spergularia campestris* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 267 (1872), in part (including, probably, citation, Montevideo, *Sello*,<sup>1</sup> and the reference, *S. remotiflora* Steud.; excluding European plants which are probably *S. rubra*), non *Arenaria rubra* var. *campestris* L. (1753); sensu Rohrb. in Linnaea, xxxvii. 229 (1871-73), probably in part (including "Forma diffusior inflorescentia laxiore pauciflora," etc. and reference, *S. remotiflora* Steud., though neither collection cited has been seen by the author; excluding "Forma multicaulis . . ."), non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia marina* sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 273 (1872), in small part (including only at least one of the Montevideo, *Sello*, specimens (see citations) and the reference *Lepigonum rupestre* Kindb. only as to the *Sello* plants), non *Arenaria rubra* var. *marina* L. (1753). *S. villosa*  $\alpha$ . *genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872), in part (including the references, *Spergula villosa* Pers., *Spergularia villosa* (Pers.) Camb., and *Lepigonum trachyspermum* Kindb. in part; and excluding *Lepigonum marale* Kindb. and the entire figure, which are *S. ramosa* and *S. rupestris*, *q. v.*); Rohrb. in Linnaea, xxxvii. 238 (1871-73), in part, for the same reasons as above. *S. villosa* var.  $\beta$ . *Berteroana* (Philippi) Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 269 (1872);<sup>2</sup> Rohrb. in Linnaea, xxxvii. 239 (1871-73); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 94 (1901). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii, 271 (1872), in part (including the synonyms, *A. media* Gay and *L. arenarium* Kindb., and excluding the synonyms, *S. ramosa* Camb. and *Spergula racemosa* Dietr., which belong with *S. ramosa*); Rohrb. in Linnaea, xxxvii. 243 (1871-73), at least in part, for the same reasons as above. *S. Liebmanniana* (Lange) Rohrb. in Linnaea, xxxvii. 242 (1871-73). *S. media*, 3. "Forma dense caespitosa humilis capsula calyce brevior," Rohrb. in Linnaea, xxxvii. 243 (1871-73).<sup>3</sup> *Tissa villosa* (Pers.) Britt. in Bull. Torr. Bot. Club, xvi.

<sup>1</sup> Although no specimens were found by the author annotated in this manner by Rohrbach.

<sup>2</sup> The collection, "prope Vicuña, *Cl. Gay*," however, was not seen by the author.

<sup>3</sup> This form cannot possibly have any relationship with *Spergularia media* (L.) Griseb. under which he puts it.



62 (1889), as to source of name but not as to plants cited which are *S. pazensis*, *q. v.*; Britt. l. c. 129 (1889), excluding the Andean plants which are probably *S. pazensis*. *T. Clevelandi* Greene, Fl. Francisc. 127 (1891); Jepson, Fl. W. Mid. Calif. 170 (1901); Greene, Man. Bot. San Francisc. Bay, 36 (1894). *T. grandis* sensu Morong & Britt., in Ann. N. Y. Acad. Sci. vii. (Enum. of Pl. coll. by Morong in Paraguay) 53 (1892), in part (including citation, Buenos Aires, Morong 3, but excluding Morong 921 which is *Spergularia ramosa* var. *diffusa*), non *Spergula grandis* Pers. (1805). *Spergularia aprica* Philippi in Anal. Univ. Chile, lxxxii. 766 (1893). *Tissa rubra* sensu K. Brandegee in Zoe, iv. 84 (1893), non *Arenaria rubra* L. (1753). *S. Clevelandi* (Greene) Robins. in Proc. Am. Acad. xxix. 310 (1894) and in Gray, Synop. Fl. i. pt. i. 251 (1897); Jepson, Fl. Calif. pt. v. 494 (1914) and Man. Fl. Pl. Calif. 360 (1923); Munz, Man. So. Calif. Bot. 163 (1935). *Tissa glandulosa* (Liebm.) Reiche, Fl. Chile, i. 196 (1896). *T. media* var. *Berteroana* (Philippi) Reiche, l. c. 201 (1896). *Buda campestris* sensu Kuntze, Rev. Gen. iii. pt. ii, 13 (1898), in part at least (including citation, Chile, Maule)<sup>1</sup> non *Arenaria rubra* var. *campestris* L. (1753). *Spergularia rubra* sensu Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 91 (1901), non *Arenaria rubra* L. (1753). *Tissa argillosa* Greene ex C. F. Baker, West. Am. Plants, ii. 18 (1903), *nomen solum*. *Alsine Clevelandi* (Greene) House in Am. Midl. Nat. vii. 134 (1921).—SOUTH AMERICA, and introduced in NORTH AMERICA: common in southern Chile and probably introduced in Uruguay around Montevideo and in the Argentine at Buenos Aires and La Plata, and also introduced in California about cities from San Diego north to San Francisco, and near Portland, Oregon. CHILE: PROV. COQUIMBO: Dept. La Serena: Punta de Teatinas (alt. ca. 10 m.), Werdermann 1542, October, 1925 (B.). PROV. ACONCAGUA: in stony pastures on hills and on river banks, Quillota, Bertero 810, October–November, 1829 (N. Y.,<sup>2</sup> F. M., Leiden, immature); on roadsides, Valparaíso, Buchtien, December 8, 1895 (U. S., G.); Valparaíso, Meyen, 1831 (B., 2 sheets, one marked by Kindb. 1861,<sup>3</sup> but with a combination which he never published); Valparaíso, Claude-Joseph 3619, October, 1925 (U. S.); Valparaíso, Wilkes Exped. (G., U. S., no seeds and puny specimens but probably *S. villosa*); Valparaíso, Bridges, 1830 (K., seeds unusually small, 0.45 mm. long); near Valparaíso, Cuming 550, 1831 (K.);<sup>4</sup> Quebrada las Zarras que domina Valparaíso, Jaffuel 637, November, 1910 (G.); Valle de Marga-Marga, 40 km. east of Valparaíso, Jaffuel 639, October, 1910 (G., immature); Quintero (La Ventana), Marta H. Looser 3374, February, 1936 (G.); Pangal Limache, Gualterio Looser, October 12, 1926 (G.); Quebrada del Lúculo (alt. 10 m.), G. Looser, February 28, 1937 (G.). PROV.

<sup>1</sup> The collection, Villa Florida, Paraguay, Kuntze, not seen by author.

<sup>2</sup> Cited under *Spergularia rupestris* Steudel, in Flora, 424 (1856).

<sup>3</sup> Cited under *L. arenarium* var. *depressa* by Kindberg, Mon. Lepig. 17 (1863).

<sup>4</sup> Cited under *Arenaria media* by Hooker & Arnott in Hooker's Bot. Misc. iii. 147 (1832).

SANTIAGO: San Antonio, *Asplund* 4301, July 23, 1921 (B., immature); Santiago, *R. A. Philippi* (U. S.);<sup>1</sup> Santiago, *Claude-Joseph* 756, January, 1919 (U. S.); Santiago, *E. E. Gigoux*, December, 1909 (G., immature); Cerro Blanco, vicinity of Santiago, *G. T. Hastings* 165, November 16, 1900 (U. S., U. C., N. Y.); Penaflo, Cerro Manuel Rodriguez, 500 m., *G. Looser* 3730, October 2, 1938 (D. S.); same locality and date, in hot sunny places in very hard soil, *G. Looser* 3731 (D. S., prostrate, matted plant with short internodes and leaves and small seeds); Mercedes, *Philippi*, November, 1888 (Santiago, photo. and fragment in G.). PROV. COLCHAGUA: *Philippi* dedit 1876 (B.,<sup>2</sup> nearly mature); Rancagua, *Bertero* (Santiago, photo. in G., type of *Arenaria Berteroana*);<sup>3</sup> *Bertero* 59 (Leiden), but locality should be "pascuis sterilibus montis La Leona," Rancagua;<sup>4</sup> Curico, *Claude-Joseph* 5204, January 1928 (U. S., unusually small seeds, only 0.4–0.5 mm. long); Potrero Grande, Curico, *Barros* 252, January 19, 1927 (G.). PROV. TALCA: *Curepto*, *Claude-Joseph* 3875, January, 1926 (U. S.); Ilico, coast of Prov. Talca, *Barros* 272, October 18, 1938 (G.). PROV. MAULE: Constitucion, *Claude-Joseph* 2075, December, 1922 (U. S., immature); Maule, *Kuntze*, February 8, 1892 (N. Y., no seeds, marked *Buda rubra* (L.) Dum. by Otto Kuntze).<sup>5</sup> PROV. CONCEPCION: Concepcion, *Claude-Joseph* 4067, November, 1925 (U. S.); vicinity of Concepcion, *Jaffuel* 2992, December, 1931 (G.); Yumbel, *Claude-Joseph* 5697, January, 1928 (U. S.); Talcaguano, *Chamisso*, 1816 (B., marked by Kindberg but with a name which he never published);<sup>6</sup> in sandy and clay pastures near Concepcion, *Poeppig* 131 (B., Leiden; Berlin specimen marked *Lepigonum macrorrhizum* (Réq.) by Kindberg 1861,<sup>7</sup> and *Spergularia marina* (L.), forma calyce capsulam aequante by Rohrbach). PROV. ARAUCO: sandy knolls in salt marsh, Arauco, *Pennell* 12933, March 6, 1925 (G., F. M.); Arauco, *Barros* 284, November 15, 1938 (G.); Peumo, *Claude-Joseph* 1436, September 20, 1921 (U. S.). PROV. VALDIVIA: *E. Reed* (K.). Chile, no locality: mittleres Chile, *Claude-Joseph*, November 19, 1922 (B. 2 sheets); Chile, "Bertero misit" 1830 (B., immature, marked *Lepigonum villosum* by Kindberg 1861<sup>8</sup> and *Spergularia remotiflora* Steud. ("in sabulosis secus torrentes Valparaiso, Chile, Bertero") by Rohrbach); Chile, *Cl. Gay* (B., marked *Arenaria* (*Lepigonum*) *media* by Gay, Fl. Chil.);<sup>9</sup> Chile, *Bridges* (B., marked *Lepigonum arenarium* by Kindberg,

<sup>1</sup> Marked *Arenaria media* L. in same hand as Santiago—label has slit in it, as though it was coll. label, probably Philippi's handwriting.

<sup>2</sup> Marked *Arenaria media* L. but in a different hand from above.

<sup>3</sup> Philippi in *Linnaea*, xxviii. 673 (1856).

<sup>4</sup> According to Rohrb. in *Linnaea*, xxxvii. 239 (1871–73).

<sup>5</sup> Cited under *Buda campestris* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

<sup>6</sup> Cited under *Lepigonum arenarium* var. *depressum* by Kindberg, Mon. Lepig. 17 (1863).

<sup>7</sup> Cited as a var. of *L. macrorrhizum* with winged seeds and flowers a little smaller by Kindberg, Mon. Lepig. 22 (1863).

<sup>8</sup> Cited under *Lepigonum trachyspermum* by Kindb. Mon. Lepig. 31 (1863).

<sup>9</sup> Probably the Gay spec. cited under *L. arenarium* by Kindb. Mon. Lepig. 17 (1863).

1861); Chile, *Bertero* 58 (G.);<sup>1</sup> Chile, *Bertero* (H. B. 32) (B.); Chile, *Cruickshanks* (K.),<sup>2</sup> mounted on a sheet with *Arenaria media* in Herb. Hooker); Chile, *Bertero* 1431 (Leiden). BRAZIL: "Campos da Bo-caina, Sao Paulo 19401 . . . Nov. C."<sup>3</sup>, *Glaziou* 19401, 1891-92 (B.). URUGUAY: DEPT. MONTEVIDEO: Sayago, *Herter* 10445, fl. October, 1907-10 (B.); Montevideo, *Arsène-Isabelle* 1838 (K., from Herb. J. Gay, immature); Montevideo, *Sello* 207 (B. 2 sheets, one marked *Spergularia salina* by Rohrbach and the other "*Spergularia marina*, forma capsula vix exserta (sp. *rupestris* Camb.)" by Rohrbach); Montevideo, *Commerson* "(sans nom.)" (Paris, Herb. Jussieu no. 13058, TYPE probably, photo. in G.,<sup>4</sup> immature but flowering); Montevideo, *Commerson* (B. ex Museo Paris 1820, immature, probably type collection); Buenos Ayres and Monte Video, *Commerson* (N. Y., type collection?). ARGENTINA: PROV. SAN JUAN: *R. Roldan* Z., November 1, 1912 (La Plata). PROV. ENTRE RIOS: Concepcion del Uruguay, *Lorentz*, October, 1875 (B.); Delta del Paraná, arroyo Negro, *Cabrera* 1979, November 24, 1931 (B., La Plata, unusually small seeds, 0.45 mm. long). PROV. SANTA FE: *Cristie* 94 (K.). PROV. BUENOS AIRES: abundant in saline meadows, Avellaneda, *Parodi* 9877, October 10, 1931 (G., immature); low saline places about the Rio Paraná, Campana F. C. C. A., *Burkart* 5664, November 5, 1933 (B., 2 sheets); in saline places, Campana, *Parodi* 8608, October 27, 1928 (G., B.); Buenos Aires, *Morong* 3, 1888-1890 (N. Y.);<sup>5</sup> rich meadows between La Plata and Ensenada, *Cabrera* 1776, October 9, 1931 (G., F. M., immature); Camina (Rio de la Plata), *Cabrera* 2897, October, 1934 (La Plata); Bosque, La Plata, *Cabrera* 3272, October 29, 1934 (La Plata); La Plata, *E. L. Ekman* 1876, October 20, 1907 (U. S., N. Y.); Belgrano, Saavedra and Palermo, *Bettfreund & Koester* 275, 1888 (B., immature); saline fields, Part. Ayul, Estancia Salaberry, *Osten* (B.). NORTH AMERICA: MEXICO: LOWER CALIFORNIA: east slope Coronado Is., *R. B. Cowles* 8, March 29, 1921 (Pam.). CALIFORNIA: San Diego Co.: San Diego, *Cleveland* 526, 1877 (G., marked *S. Clevelandi* by Robinson<sup>6</sup> and *Tissa villosa* by Britton);<sup>6</sup> San Diego, *K. Brandegee*, about 1891 (G., marked *S. Clevelandi* by Robinson);<sup>7</sup> common about dwellings, San Diego, *Brandegee* 3373, April 27, 1903

<sup>1</sup> Cited under *Spergularia villosa* var. *Berteroana* by Rohrb. in Fl. Bras. xiv. pt. ii. 269 (1872) and under *S. rupestris* by Steud. in Flora, 424 (1856).

<sup>2</sup> Cited under *Arenaria media* in Hook. Bot. Misc. iii. 147 (1832).

<sup>3</sup> Locality obtained from Bull. Soc. Bot. France lii. Mém. 3: 35 (1905), where there is a list of plants of central Brazil by *Glaziou*, also his itinerary in Brazil.

<sup>4</sup> Has a tag pasted on top of label which says *Spergula villosa* Poir. Encycl. & Pers. Synops. i. This probably was not put on the sheet at time of naming by Persoon. The specimen, therefore, was probably not annotated by Persoon.

<sup>5</sup> Cited under *Tissa grandis* by *Morong & Britt.* in Enum. of Pl. Coll. Morong in Paraguay, 53 (1892) in Ann. N. Y. Acad. Sci. vii. 53 (1892).

<sup>6</sup> Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894); also cited under *Tissa villosa* by Britt. in Bull. Torr. Club, xvi. 129 (1889) and designated the type of *Tissa Clevelandi* Greene by Jepson, Fl. Calif. v. 494 (1914).

<sup>7</sup> Cited under *S. Clevelandi* by Robins. in Proc. Am. Acad. xxix. 310 (1894).



(G., U. S., Cal. Acad., U. C., Pom., D. S.; Notre Dame); National City, *Abrams* 3525, May 18, 1903 (G., U. S., U. C., D. S., Pom.); 1 mile sw. of Otay, on road to Tijuana (Lower Sonoran), *C. B. Wolf* 2088, May 26, 1931 (Cal. Acad., D. S., Pom.). Orange Co.: damp ground, Newport Bay, *L. M. Booth*, 1089, May 24, 1932 (U. C., Pom.). Los Angeles Co.: well established at side of path, Claremont, *I. M. Johnston* 1976, April 25, 1918 (U. S., D. S., Pom.). Santa Barbara Co.: along the streets, near Santa Barbara, *Eastwood* 207, May, 1908 (U. S.); Santa Barbara, *Wootton* 1912 (U. S.). Monterey Co.: Camphora, *Eastwood & Howell* 2186, May 5, 1936 (G., Cal. Acad.). Santa Clara Co.: San Jose, *Mrs. E. A. Bush* 1880 (U. S.); clay ridges in foothills near Stanford Univ., *C. F. Baker* 666, May 27, 1903 (G., U. S., Cal. Acad., Pom., U. C., Notre Dame, distributed as *Tissa argillosa* Greene). San Francisco Co.: Mission Hills, San Francisco, *Michener*, June, 1893 (G., D. S.); San Francisco, *Jepson*, May 20, 1891 (G.); Presidio, San Francisco, *Greene*, May 27, 1893 (U. C.); Presidio, San Francisco, *Heller* 5699, June 12, 1902 (G., D. S., Pom., U. S.); Laurel Hill Cemetery, San Francisco, *Eastwood* 235, June 7, 1912 (G., U. S., Cal. Acad.). Solano Co.: Benicia, *Eastwood* 10509, May 15, 1921 (Cal. Acad.). El Dorado Co.: New York Ravine, *K. Brandegee*, May 8, 1907 (U. C.). San Diego Co.: roadsides, old clearing, La Jolla, *F. E. & E. S. Clements* 48, April 7, 1914 (G., U. C.). OREGON: Multnomah Co.: Lower Albina, *E. P. Sheldon*, July 21, 1902 (Ore.).

No specimen has been located labeled "rather sandy uplands about San Diego," as the type of *Tissa Clevelandi* Greene should be. There is a collection made in San Diego, *Cleveland* 526 (1877), which probably is the one cited by Greene. This collection was later designated as the type of Greene's species by Jepson. In the Greene herbarium at Notre Dame there is a specimen collected by *T. S. Brandegee* in San Diego, April 27, 1903, which was labeled by him and marked typical. There is another of the same collection, marked not typical, which differs only in being more matted and with the leaves growing in every direction. Furthermore, no specimen has been found labeled "gravelly knolls at the Presidio, San Francisco." However, a collection made and labeled by Greene in 1893 from this locality indicates what the plant probably was. All the plants mentioned in the description are alike in all diagnostic characters and to my mind are identical with the South American plants cited above.

Since on the Pacific Coast of North America the plant always occurs around cities or other habitations, one concludes that it was introduced from South America. It has been collected only from the vicinity of the large cities of Montevideo, Uruguay and Buenos Aires and La Plata, Argentina, while it seems very common in south-central

Chile. *One is inclined to think, then, that Chile is its native habitat, though further work by botanists in South America is needed before this surmise can be verified.*

This species shows great variation in habit, from robust sprawling plants to short, delicate, matted ones. These occur sporadically throughout the range, due seemingly to ecological conditions (see *G. Looser* 3730 and 3731, Penafor, Cerro Manuel Rodriguez, examples of both extremes from the same place). Plants with extremely small seeds, 0.4 mm. long, occur sporadically throughout the range and may have small or large capsules. Plants with papillose seeds occur just as often as those with them non-papillose and in the same geographic range.

30. *S. COLLINA* I. M. Johnst. (PLATE 595, FIGS. 4a-4c). *Annual with open dichotomous branching: diffuse stems* 1-5 from the base, 5-25 cm. long; *internodes* below the inflorescence few, 7-35 mm. long, 0.5-1.5 mm. in diameter; *leaves* not fascicled, fleshy, sparsely glandular-pubescent, mucronate, 6-18 mm. long, 1-2 mm. broad; *stipules* inconspicuous, deltoid, attenuate, 1.2-2 mm. long; *inflorescence* a widely angled leafy cyme, not sharply differentiated from vegetative parts, with elongated internodes, 1-3 cm. long; *bracts* foliaceous, 0.3-1.5 mm. long; *sepals* ovate-lanceolate, glandular-pubescent, 3.7-4.5 mm. long; *petals* white, ovate, 3.5-5 mm., usually equalling the calyx; *stamens* 10; *styles* 3, separating to the base as flower matures, 0.8-1.2 mm. long; *mature capsules* stipitate, 4-5.5 mm. long, exceeding the calyx by 0.3-1 mm.; *fruiting pedicels* filiform, strongly reflexed, the lower 8-22 mm. long; *seeds* 0.6-0.8 mm. long, black, rounded at the summit, deeply sculptured in vermiform pattern with crowded, long, black papillae, not winged.—Contrib. Gray Herb. lxxxi. 89 (1928); Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru Pt. 2, no. 2, 630 (1937). *Drymaria molluginea* sensu Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911), non *Alsine molluginea* Lagasca (1815).—SOUTH AMERICA: open sandy hills on coast of Peru in Dept. Arequipa. PROV. ISLAY: DEPT. AREQUIPA: lower edge of green belt on desert hills in back of port, Mollendo, Johnston 3568, October 16, 1925 (G. TYPE, F. M.); after October rains, Mollendo, A. S. Hitchcock 22355, November 17, 1923 (U. S.); Atico, Raimondi 11609, November, 1863 (B.). MAP 11.

This plant was illustrated by Weberbauer in Engler & Drude, Veg. der Erde, xii. 144, fig. 9 (1911) but erroneously called *Drymaria molluginea* Didr. The latter name refers to a Mexican plant with bifid petals and has its source from plants grown in the Hortus Regius, Madrid, from seeds collected by Sessé and Mocino in "Nova Hispania." Lagasca called it *Alsine molluginea*<sup>1</sup> (photo. and drawings of

<sup>1</sup> Lagasca, Gen. et Spec. 13, no. 170 (1815).

seeds and stipules in Gray Herb.) but it later became *Drymaria molluginea* (Lag.) Didr.<sup>1</sup>

31. *S. Spruceana*, spec. nov. (TAB. 595, FIG. 2a-2c). Perennis: radice centrale ad 1 cm. crassa: caudice ramoso vel simplice, caulibus multis gracilibus diffusis, 3-30 cm. longis; internodiis caulibus partis effloriferi gracilibus, 0.8-1.5 mm. crassis, 3-43 mm. longis: foliis plerumque fasciculatis linearibus complanatis mucronatis margine villosoglanduloso excepto glabris, 3-45 mm. longis, 0.5-1 mm. latis: stipulis scariosis albidis triangulari-acuminatis, 3-6 mm. longis, basi vel paullo supra basin connatis: floribus in cymam contractam dispositis; bracteis infimis longis foliosis, ad 15 mm. longis supremis minimis vel obsoletis; internodiis saepe sparse villosoglandulosis, inferioribus 6-15 mm., superioribus brevissimis, 1.5-3 mm. longis: sepalis lanceolatis, glabris, plerumque glandulis minutis pallidis punctulatis praecipue in parte superiore, margine scariosis, recurvatis, apice incurvato saepe cucullato, 3.2-4.8 mm. longis; petalis albis ovatis, 2-2.5 mm. longis; staminibus 10; stylis 3, ad basim divisis: capsulis maturis 3-4.5 mm. longis, sepala aequantibus vel eis 0.1-0.5 mm. brevioribus: pedicellis fructiferis haud reflexis, infimis, 2-5 mm. longis: seminibus pallide brunneis lucidis, lineis vermiformibus intertextis sculptis, saepe verrucis minutis elongatis haud papillatis, exalatis, vel saepe appendice parva scariosa ornatis, 0.5-0.6 mm. longis.—SOUTH AMERICA: found only in the high Andes of Ecuador. ECUADOR: 9937 ft., Quito, Prov. Pichincha, *Jameson* (K.); vicinity of Quito, Latacunga or Ambata in sandy places, *Sodi* 123 (B.); Quitensian Andes, *Couthouy*, 1855 (G., N. Y.); Tixan, Prov. Chimborazo, *Rose* 22403, August 27, 1918 (G., U. S.); open ground Urbina, paramo on east flank of Mt. Chimborazo, Prov. Chimborazo, alt. 3600 m., *A. S. Hitchcock* 22039, October 5, 1923 (U. S.); in Andibus Ecuadorensibus, *R. Spruce* 5444, 1857-9 (G. TYPE, K., B., F. M.). MAP 26.

The name *Spruceana* was suggested to me by an unpublished note of Britton's on the *Spruce* collection in the Gray Herbarium. It is a pleasure to name it after RICHARD SPRUCE, a courageous explorer and an accurate observer.

32. *S. colombiana*, spec. nov. (TAB. 596, FIG. 4a et 4b). Perennis vel annua?: caulibus saltem 12-25 mm. longis, multi-ramosis: internodiis caulibus partis effloriferi glabris, 6-20 mm. longis, 0.4-1.2 mm. crassis: foliis paululum fasciculatis, 1-2 foliis axillaribus, mucronatis, glabris, 15-20 mm. longis, 0.6-0.8 mm. latis; stipulis late lanceolato-acuminatis, 4.5-5.5 mm. longis: floribus in cymam laxam ramosam dispositis; internodiis infimis 7-15 mm. longis, 0.4-0.6 mm. crassis; bracteis foliosis, supremis minimis: sepalis linearibus, sparse villosoglandulosis, 4.2-5.6 mm. longis; petalis albis, ovatis, 2.8-4 mm. longis, sepalis 1.6 mm. brevioribus; staminibus 5-10; stylis 3, ad basim

<sup>1</sup> Didr. in *Linnaea*, xxix, 738 (1859).



divisis, 0.6 mm. longis: capsulis pene maturis, 5–5.2 mm. longis sepalis aequantibus vel eis 1 mm. longioribus pedicellis fructiferis filiformibus, villosoglandulosis, patentibus, 5–7 mm. longis: seminibus immaturis, lineis vermiformibus intertextis sculptis, alatis, ala albidula, scariosa, 0.2 mm. lata.—SOUTH AMERICA: known as yet only from Bogota, Colombia. COLOMBIA: PROV. BOGOTA: Cordillera de Bogota, 27 m. alt., New Granada, *J. Triana*, 1851–1857 (K. TYPE, N. Y.); *Linden* 178 (K.). MAP 27.

33. *S. PLATENSIS* (St. Hil. & Adr. Juss.) Fenzl (PLATE 595, FIGS. 3a–3d and MAP 28). Annual: *caudex* bearing 3–many diffuse stems, usually many, 5–30 cm. long; *internodes of stem below the inflorescence* glabrous, slender, 8–40 mm. long, 0.4–1.4 mm. in diameter: *leaves* filiform, glabrous, mucronate, usually not fascicled or, if so, with only 1–2 leaves at the axils, 10–40 mm. long, 0.4–1.2 mm. broad; *stipules* deltoid, acuminate, as long as broad or slightly longer than broad, 1.5–3.5 mm. long; *inflorescence* a much compounded cyme, glabrous throughout; *internodes* 3–28 mm., usually 7–15 mm. long; *bracts* usually minute, 0.5–10 mm., usually 0.5–4 mm. long; *sepals* broadly lanceolate, bluntly tipped, 0.8–1.6 mm. long; *petals* minute, white, narrowly ovate, 0.6–1 mm. long, as much as 0.4–1 mm. shorter than the calyx; *stamens* 5; *styles* 3, erect when young, separated nearly to the base, 0.3–0.4 mm. long; *mature capsules* 1.4–2.6 mm., usually 1.8–2.2 mm. long, as much as 0.4–1 mm., usually 0.6–0.8 mm. longer than the calyx: *fruiting pedicels* filiform, never reflexed, the lowest 2–8 mm., usually 4–6 mm. long, the upper ones very short: *seeds* 0.35–0.4 mm. long, light or reddish brown, often with a silvery tinge, often angular because of compression in the capsule, deeply sculptured in interwoven vermiform pattern, usually covered with large, brown, glandular, often cup-shaped papillae, not winged.—Ann. Wien. Mus. ii. 272, in note (1839); Rohrb. in Mart. Fl. Bras. xiv. ii. 267, pl. 61, fig. 2 (1872); Rohrb. in Linnaea, xxxvii. 228 (1871–73); Robins. in Gray, Synop. Fl. i. 251 (1897); Arech. in Anal. Mus. Nac. Montevideo, iii. (Fl. Uruguay i.) 93 (1901); Jepson, Fl. Calif. 495 (1914) and Man. Fl. Pl. Calif. 361 (1923); Munz, Fl. So. Calif. 163 (1935). *Balardia platensis* St. Hil. & Adr. Juss. in St. Hil. Fl. Bras. Mer. ii. 181, pl. 111 (1829); C. Gay, Fl. Chile, ii. 524 (1846). *Lepigonum gracile* Wats. in Proc. Am. Acad. xvii. 367 (1882). *Tissa gracilis* (Wats.) Britt. in Bull. Torr. Bot. Club, xvi. 128 (1889); Small, Fl. Se. U. S. 418 (1903). *Buda platensis* (St. Hil. & Adr. Juss.) Kuntze, Rev. Gen. i. 50 (1891). *Spergularia angolensis* Philippi in Anal. Univ. Chile, lxxxi. 771 (1892). *S. gracilis* (Wats.) Robins. in Proc. Am. Acad. xxix. 311 (1894). *Tissa platensis* (St. Hil. & Adr. Juss.) Hassler in Bull. Herb. Boiss. sér. 2, vii. 931 (1907). *T. platensis* subsp. *septentrionalis* Hassler<sup>1</sup> l. c. *T. platensis* var. *septentrionalis* (Hassl.) Hassler, Contrib. Fl. Chaco

<sup>1</sup> This variety must be the same as the species because the characters given, such as stipules widely ovate, petals deficient, style slightly joined at the base, are not sufficient to separate this from the species nor do they characterize var. *Balsanae*.

Argentino-Paraguay, pt. i. (Fl. Pilcomay.) 58 (1909). *S. texana* Hy, Rev. Gen. Bot. xxv. 316 (1913) in obs.<sup>1</sup> *Alsine platensis* (St. Hil. & Adr. Juss.) House in Am. Midl. Nat. vii. 134 (1921). *S. platensis* var. *septentrionalis* (Hassl.) Hauman & Irigoyen in Anal. Mus. Nac. Hist. Nat. Buenos Aires, xxxii. 193 (1923).—SOUTH AMERICA: common in the Argentine, and probably introduced in central Chile, southern California and Texas. BRAZIL: no locality, "*St. Hilaire misit*," 1830 (B., marked *Balardia platensis*, probably in Cambessedes' handwriting). ARGENTINA: PROV. CORRIENTES: salt marshes, Cado de Aposo, *Niederlein* 1171, October 8, 1886 (B.). PROV. ENTRE RIOS: on muddy ground on the banks of the river Gualeguayehn, Concepcion del Uruguay, *Lorentz* 1203, October, 1877 (B.); Medanos, *Burkart* 3572, December 3, 1930 (B.); Concepcion del Uruguay, *Lorentz* 1707, September, 1877 (B.); Delta Paraná, Arroyo Brazo Largo, *Burkart* 8295, December 12, 1937 (F. M.); Islas Victoria, *Burkart* 8623, December 26, 1937 (F. M.); Fontana (Chaco), *Meyer* 2375, November, 1937 (G., D. S.). PROV. SANTA FE: Malabrigo, F. C. S. F., *Burkart* 5749, November 12, 1933 (B.). PROV. TUCUMÁN: on the banks of a dry lake, alt. 300 m., Chanar Pozo, Dept. Leales, *Venturi* 413, September 9, 1919 (U. S.); alt. 450 m. Rio Sali, Dept. Capital, *Venturi* 1908, September 13, 1922 (G., U. S., La Plata); rich meadows, 3000 m. alt., Sierra de Cajou, Dept. Tafi, *Venturi* 10055, January 3, 1929 (U. S.). PROV. BUENOS AIRES: virgin pastures, Avellaneda, *Parodi* 5847, October 18, 1924 (B.); low brackish places about the R. Paraná, Campana, F. C. C. A., *Burkart* 5655, November 5, 1933 (B.); low flood-plain of R. Paraná, Isla Mariel, *Burkart* 3052, December 6, 1928 (B.); Buenos Aires, *Bettfreund* 188b + 130, misit 1888 (B.); Buenos Aires, *Tweddle* (K.); wet land, Abasto, near La Plata, *Cabrera* 2388, October 19, 1932 (La Plata); Bahía Blanca, *Darwin* (K.). PROV. RIO NEGRO: Rio Negro, *Aug. Scala* 47 (n. 104 Herb. Scala Rio Negro), January, 1916 (La Plata); in irrigated ground, General Roca and vicinity, Rio Negro Valley (250–360 m. alt.), *Walter Fischer* 166, Nov. 14, 1914 (G., U. S., N. Y., F. M.). Locality not found: Las Palmas, *Niederlein* 128, Aug. 30, 1892 (B.). Locality not given: *Hicken* 486 (*Chloris Platensis* Argentina) (N. Y., Cal. Acad.). CHILE: PROV. SANTIAGO: in plateis urbis, Santiago, *R. A. Philippi*, pl. Chilens. ed. *R. F. Hohenacker* 625 (K.); in the city of Santiago, *Philippi* 1250 (B., marked *Balardia platensis*); *Philippi* ded. 1888 (B.); malza frecuente, Santiago, *Looser* 89, November 10, 1924 (G.). PROV. BIO-BIO: Dept. Angol: Angol, *Philippi* 2284, November, 1887 (Santiago, photo. and fragment in G., type of *S. angolensis* Philippi). No definite locality given: Chile (Leiden), no collector given. NORTH AMERICA: TEXAS: wet sands near Dallas, *Reverchon*, April (Curtiss-N. Am. pl. no. 333\* and Texas Flora 72) (G., U. S., B., one of the Berlin sheets and the Gray collection marked *Lepigonum*

<sup>1</sup> Belongs to this species because of the citation, Texas, *Reverchon*, and white flowers and naked cymes, which in combination do not apply to any other species of the region.

*gracile*<sup>1</sup> by Watson); sandy lands, common, Dallas, *Reverchon* (G.); common in wet places, Columbia, Brazos R., *Bush* 79, April 20, 1900 (G., U. S.). CALIFORNIA: Riverside Co.: desiccating mudflat, one half mile south of Lake Elsinore, *Munz* 5070, April 29, 1922 (Pom., U. C.). Los Angeles Co.: dried ponds near Compton, *Nevin & Parry*, 1881 (G., marked *Lepigonum gracile* by Watson)<sup>2</sup>; Los Angeles, *Parry* 15, 1881 (G., U. S.,<sup>3</sup> marked *L. gracile* by Watson); low brackish flats near coast, Bixby, *Braunton* 436, June 20, 1902 (U. S.), marked *Lepigonum gracile* by Watson); on adobe mesa between Rivera and Florence, *Abrams* 3252, April 14, 1903 (G., U. S., D. S., U. C., Pom.); Inglewood, *Abrams* 1494, April 12, 1901 (D. S., Pom.). San Diego Co.: Carriso Creek, *Brandegee*, April 20, 1893 (U. C.); Otay, *Orcutt* 1201, May 13, 1882 (G.).<sup>3</sup>

*S. platensis* is quickly separated from all other *Spergularias* by its delicate habit, very small and numerous capsules, and much compounded cyme. However, there are no characters sufficiently important to warrant placing it in a separate genus such as *Balardia* St. Hilaire & Adr. Juss.<sup>4</sup>

The geographical distribution of this species is very peculiar. It is evident that Argentina is its native home and that it was introduced into Chile, since it has only rarely been collected there and from civilized places. It also seems probable that the Californian and Texan stations represent introductions, though, to prove the point, more collections should be made, especially with historical information regarding the localities at hand.

34. Var. **Balansae**, var. nov. (TAB. 595, FIG. 3e et 3f). Perennis: caudice nodosa, 1–2 caulibus gracilibus erectis, 12–18 cm. longis; internodiis caulibus partis effloriferi gracilibus, glabris, 7–24 mm. longis, 0.4–0.6 mm. crassis; foliis vulgo haud fasciculatis vel interdum 1–2 foliis axillaribus, filiformibus, glabris, mucronatis, 15–30 mm. longis, 0.4–0.8 mm. latis; stipulis minimis, triangularibus, tam longis quam latis, 1.2–1.6 mm. longis; floribus in cymam patentem simplicem glabram dispositis; internodiis filiformibus, infimis 4–12 mm. longis; bracteis 0.6–2.2 mm. longis; sepalis lanceolatis, apicibus obtusis, glabris, 2.2–2.8 mm. longis; petalis albis, anguste ovatis, 1.2–1.4 mm. longis; staminibus 5, sepalis adversis; stylis 3, 0.4 mm. longis, ad basim divisis; capsulis maturis 3.2–3.8 mm. longis, sepalis 1–1.2 mm. longioribus; pedicellis fructiferis filiformibus, haud reflexis, infimis

<sup>1</sup> Cited as Curtiss no. 333\*, under *Lepigonum gracile* by Sereno Watson in Proc. Am. Acad. xvii. 367 (1882), and also under *Tissa gracilis* by Britt. in Bull. Torr. Bot. Club, xvi. 128 (1888).

<sup>2</sup> Cited under *Lepigonum gracile* by Sereno Watson, but as collected only by J. C. Nevin.

<sup>3</sup> Cited under *Tissa gracilis* (Wats.) Britton in Bull. Torr. Bot. Club, xvi. 128 (1888).

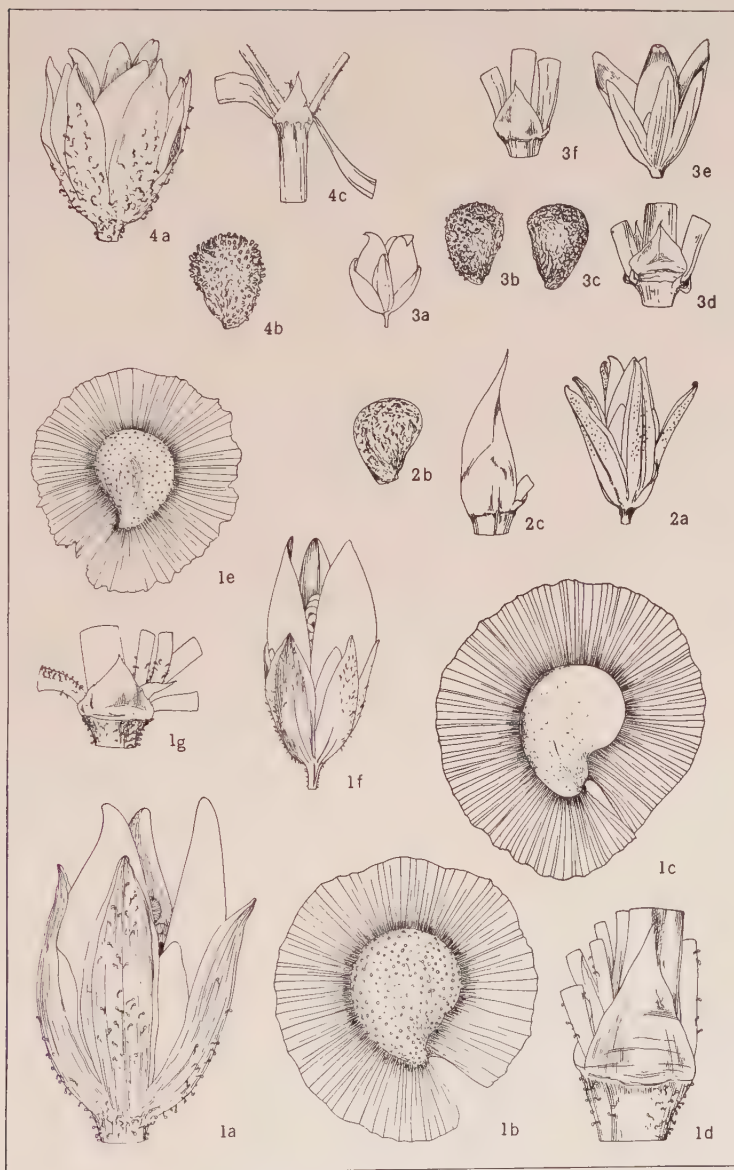
<sup>4</sup> In St. Hilaire, Fl. Bras. Mer. ii. 180, t. 111 (1829).



7-10 mm. longis; seminibus eis var. typicae similibus.—SOUTH AMERICA: known only from Paraguay. PARAGUAY: in the prairies in impermeable clay soil, *Balansa* 2271, May 27, 1874 (K., TYPE); Villa Fonda, *Kuntze* (N. Y., marked *Buda campestris* by Otto Kuntze).

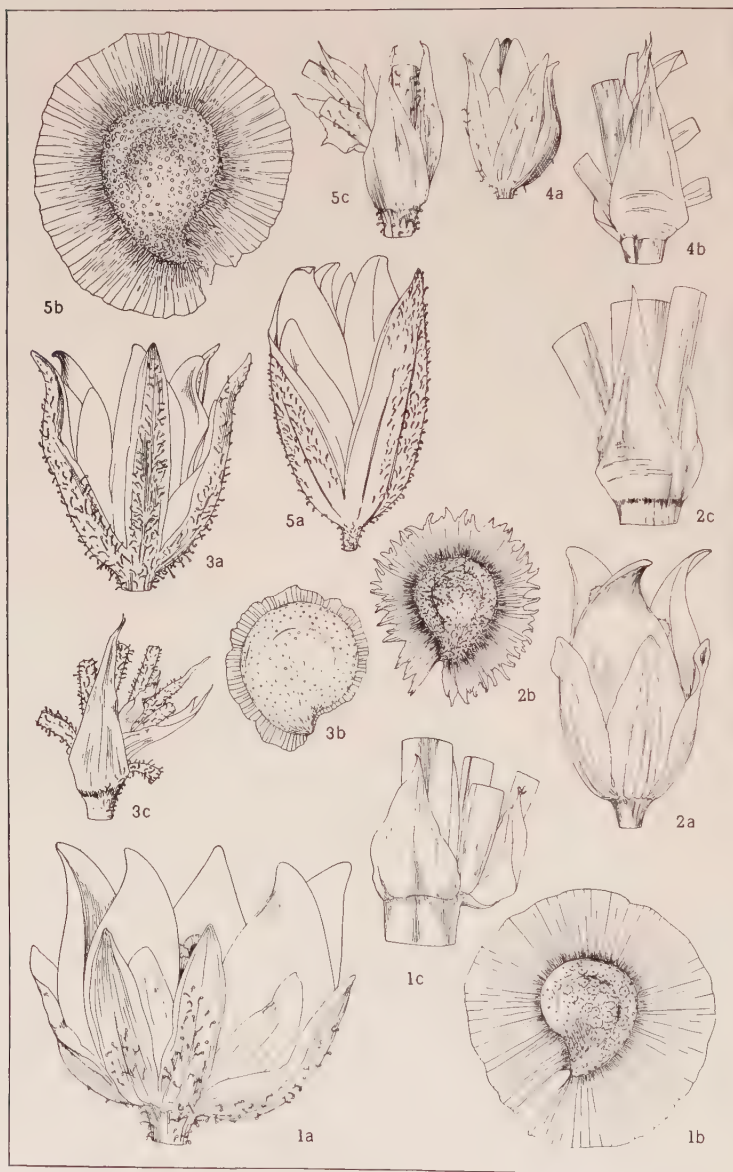
The variety differs from the typical form of the species in erect habit, perennial root, smaller stipules, simple cyme, and larger sepals and capsules. It is similar in its lack of pubescence, shape of stipule, number of stamens, length of style, leaves, petals, and, most important of all, in having exactly the same seeds. The latter fact is the main reason for giving it varietal rather than specific rank.

35. *S. RAMOSA* Camb. (PLATE 595, FIGS. 1a-1d and MAP 29). Perennial with a heavy ligneous central root: *caudex* well developed, knotty and branched, bearing from 1-15 nearly always erect stems, 8-37 cm. long, often budded from those of the previous season; *internodes of the stem below the inflorescence* usually glabrous though sometimes glandular-pubescent, 4-35 mm., usually 8-20 mm. long, 0.4-2.5, usually 0.8-2 mm. in diameter: *leaves fascicled*, filiform, mucronate, 10-45 mm. long, 0.5-1 mm. wide, usually glabrous, occasionally densely glandular-pubescent; *stipules lanceolate-acuminate, very broad at the base, at least twice as long as broad*, 2.5-7 mm., usually 3-5 mm. long: *inflorescence always glandular-pubescent throughout with internodes* roughly equalling or somewhat shorter than those below, 5-30, usually 10-20 mm. long, 0.4-1 mm. in diameter with minute *bracts* 1-4, usually 1.2 mm. long: *sepals* broadly linear-lanceolate, with a narrow scarious margin, always glandular-pubescent, 4.5-10 mm., usually 6-8 mm. long; *petals* white, ovate, 3-8 mm., usually 4-6 mm. long, 0.5-4 mm., usually 1-3 mm. shorter than the calyx; *stamens* 6-9; *styles* 3, parted to the base, 1-1.4 mm. long: *mature capsules* with valves often purple-tinged inside at the apex, 6-11.5 mm., usually 7-9 mm. long, occasionally equal to the calyx but usually 0.5-4 mm., commonly 0.5-2 mm. longer than the calyx: *fruiting pedicels* never reflexed, the lower 5-21 mm. long: *seeds* 0.6-0.9 mm., usually 0.7-0.8 mm. long, light brown, dull, rounded in outline, surface usually smooth but sometimes covered with regularly arranged, brownish papillae, surrounded by a broad, shining, entire wing, often tinged with brown, 0.3-0.7 mm., usually 0.4-0.6 mm. wide.—Camb. in St. Hil. Fl. Bras. ii. 178 (1829); Gray, Bot. Wilkes Exped. 1838 42, i. 121 (1824); Kindb. Synop. 16 (1856) (though Kindberg questioned whether it was a *Spergularia* and placed it under species excluded); Arech. in Ann. Mus. Nac. Montevideo, iii. (Fl. Uruguay, i.) 95 (1901). *Arenaria grandis* sensu HBK., Nov. Gen. et Sp. vi. 24 (1823), ex char., "Vidi in *A. grandis*: stamina 10 et stylos tres; . . .", non *Spergula grandis* Pers. (1805): *Arenaria grandis* sensu DC. Prod. i. 401 (1824), in small part, including only the reference HBK., non *Spergula grandis* Pers. (1805); Gay, Fl. Chile, i. 267 (1845), for the most part, excluding



SPERGULARIA: stipule, calyx and capsule,  $\times 5$ ; seeds  $\times 25$ .

*S. RAMOSA*, figs. 1a-1d; var. *DIFFUSA*, figs. 1e-1g. *S. SPRUCEANA*, figs. 2a-2c. *S. PLATENSIS*, figs. 3a-3d; var. *BALANSAE*, figs. 3e and 3f. *S. COLLINA*, figs. 4a-4c.



SPARGANUM: stipule, calyx and capsule  $\times 5$ ; seeds  $\times 25$ .  
*S. GRANDIS*, figs. 1a-1c. *S. LEVIS*, figs. 2a-2c. *S. RUPESTRIS*, figs. 3a-3c.  
*S. COLOMBIANA*, figs. 4a and 4b. *S. PAZENSIS*, figs. 5a-5c.



only reference to DC. in part, non *Spergula grandis* Pers. (1805). *Spergularia macrocarpa* Presl, Rel. Haenk. ii. 9 (1831), excluding synonyms Pers. and DC. *S. racemosa* G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831), probably an error in spelling for reference is made to Camb. *S. grandis* sensu G. Don, l. c., in part, including synonym *Arenaria grandis* HBK. and excluding *S. grandis* Pers., non *Spergula grandis* Pers. (1805); sensu Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the 3-merous element of the description and the synonyms *Arenaria grandis* HBK. and DC. "forma trigyna," *Spergularia macrocarpa* Presl, *Lepigonum grande* (Pers.) Kindb. and *Lepigonum arenarium* Kindb. in part (see the synonymy of *S. villosa*), and excluding the 5-merous element of description and all other synonyms, all of which elements belong with *S. ramosa*, q. v.), non *Spergula grandis* Pers. (1805); sensu Rohrb. in Linnaea, xxxvii. 236 (1871-73), in part, for the same reasons as above, non *Spergula grandis* Pers. (1805); sensu Macbride, Field Mus. Pub. Bot. xiii.—Fl. Peru pt. 2, no. 2, 631 (1937) (because collection cited is from Huanuco: Montana, Haenke), non *Spergula grandis* Pers. (1805). *Spergula racemosa* D. Dietr. Syn. Pl. ii. 1599 (1840), probably likewise an error, for reference is made to Camb. *Lepigonum grande* sensu Kindb. Syn. Lepig. 15 (1856), including ref. Presl and, in part, DC., non *Spergula grandis* Pers. (1805). *L. arenarium* Kindb. Mon. Lepig. 17, t. i, fig. 3 (1863), in part (including references HBK. and *S. ramosa* Camb., and the citations Montevideo, Sello, and Rio Negro, Wilkes Exp. and the right-hand plant in the figure including the entire-winged seed; excluding the remaining references, citations (Lambert ?), and illustration, all of which belong with *S. villosa*). *Lepigonum trachyspermum* Kindb. Mon. Lepig. 31, t. ii, fig. 16 (1863), in part (including Brazilian specimens and in part Montevideo, Sello, spec.; excluding references Camb. and Pers. and specimen, Chile, Bertero, which is *S. villosa*, and part of Montevideo, Sello, which is *S. rupestris*, and Maldonado?). *S. villosa* var. *α genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61, fig. 1 (1872), in part (including only the specimen, Sorata, Mandon 946, and the figure; excluding the right-hand, narrow-winged seed which is from *S. rupestris*); Rohrb. in Linnaea xxxvii. 238 (1871-73), in part (including Mandon 946 and possibly part of the Sello collections; excluding all references which apply to *S. villosa* and *S. rupestris*). *S. media* 2. "Forma capsula calycem aequante vel vix superante," Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 271 (1872), in part (including the synonyms *S. ramosa* Camb. and *Spergula racemosa* Dietr.; excluding the remainder, which belong with *S. villosa*); Rohrb. in Linnaea, xxxvii. 243 (1871-73), in part, for same reasons as above. *Buda marina* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), because of citation Patagonia, Moreno and Tonini 343, non *Arenaria rubra* var. *marina* L. (1753). *Buda grandis* sensu Kuntze, l. c. (1898), in part (including citations, Rio Santa Lucia, Uruguay and Cochabamba, Bolivia;<sup>1</sup> excluding *Hauthal* 661, and

<sup>1</sup> Another collection cited here, Ceres, Cordoba, though not examined by the

Sierra de Solis, which are *S. levis*), non *Spergula grandis* Pers. (1805); sensu Macloskie in Rep. Princeton Univ. Exp. Patagonia, viii. pt. 1, 395 (1905), non *Spergula grandis* Pers. (1805). *S. villosa* sensu Macbride, Field Mus. Pub. Bot. xiii—Fl. Peru, ii. 633, probably (because he says the seeds are yellow, pedicels erect and spreading, and cites Mart. Fl. Bras. xiv. pt. 2, pl. 61, none of which data apply to *S. villosa* (Pers.) Camb.),<sup>1</sup> non *Spergula villosa* Pers. (1805).—SOUTH AMERICA: common in most of Argentina and southern Uruguay and adjacent southeastern Brazil, also local in Bolivia. BRAZIL: Brasilia meridionalis, *Sello* 3107<sup>2</sup> (B., seeds papillose on rim, marked *Lepigonum villosum* Kindb. 1861);<sup>3</sup> *Sello* 3107a<sup>2</sup> (B., seeds papillose on rim); Brazil, *Sello* 1840<sup>4</sup> (K., 2 of the plants only, seeds smooth); Porto Alegre, Rio Grande do Sul, *Tweedie* (K., part of coll. only, seeds papillose). BRAZIL: no locality, *Sello* (Leiden). URUGUAY: DEPT. CANELONES: river shores, Santa Lucia, *H. M. Smith* 53, November 14, 1922 (U. S., seeds smooth); gravelly, dry, exposed soil, Independencia, *Herter* 652, November, 1926 (U. S., seeds papillose). DEPT. MONTEVIDEO: Montevideo or R. v. Campos-Vitoria, *Sello* d. 2 (B., 5 sheets, K.; only part of most of the sheets, seeds papillose); Montevideo, *Sello* d. 394 (B., 2 sheets; only part of one sheet, seeds hubbled; marked *Lepigonum villosum* (Camb.) by Kindberg, 1861); Montevideo, *Sello* (B., seeds papillose; marked *Lepigonum villosum* by Kindberg, 1861); Montevideo, *Sello* (B., only part of the specimens, seeds papillose; marked *Lepigonum villosum* Kindb., 1861); Montevideo, *Sello* (B., seeds papillose, marked *Lepigonum marinum* by Kindberg, 1861); Montevideo, *Capt. King* (K., immature but has 3 styles, mounted on a sheet with *Arenaria bonariensis* in Hooker Herb.); Montevideo, *Gibert* 410, 1866 (K., seeds smooth); Montevideo, *Sello* d. 2178 (B., seeds smooth, marked *Lepigonum arenarium* by Kindberg, 1861);<sup>5</sup> in pasture lands, near Montevideo, *Safford*, October 24, 1886 (U. S., seeds papillose); exposed dry ground, Arroyo Piedras, *Herter* 652<sup>b</sup>, February 5, 1928 (N. Y., seeds papillose only on rim); Pocitos, *H. M. Smith* 15, October 14, 1922 (U. S., seeds smooth); exposed soil, Pocitos, *Herter* 159, November, 1924 (G., B., U. C., seeds smooth); Cerro de Montevideo, *Gibert* 158, March, 1867 (K., seeds hubbled); dry, exposed, gravelly and sandy soil, Cerro, *Herter, Schulz, and Strahl* 650<sup>b</sup>, October, 1925 (G., N. Y., F. M., U. C., immature). Dept. San José: sandy ground, Santa Lucia, *Osten* 21691, November 25, 1929 (G., seeds papillose). Dept. Colonia: around

author, may be the same as others made by Kuntze in Cordoba, which are *S. ramosa* var. *diffusa*.

<sup>1</sup> It is interesting to note that neither *S. villosa* nor *S. ramosa* grow in Peru.

<sup>2</sup> Locality found in Urban in Engler, Bot. Jahrb. xvii. 196 (1893); "2994—3330 ebenda von Encrusilhada nach Caçapana und Rio S. Barbara (Nov. Dec. 1825)."

<sup>3</sup> Cited by Kindberg under *L. trachyspermum*, Mon. Lepig. 31 (1863).

<sup>4</sup> Locality found in Urban l. c.: "d. 1504—1853—ebenda vom Rio Pardo über Caçapana nach Bagé (Dec. 1823, Jan. 1824)."

<sup>5</sup> Cited under *Lepigonum arenarium* by Kindb. Mon. Lepig. 17 (1863).

Carmelo, *Cabrera* 3189, December 5, 1934 (La Plata, seeds smooth); high lands, Riachuelo, *Cabrera* 3298, April, 1935 (La Plata, seeds papillose); downs, Riachuelo, *Cabrera* 3903, November 15, 1936 (F. M., rim of seed papillose). Uruguay, locality not found: Rio Santa Lucia, *Kuntze*, November, 1892 (N. Y., seeds papillose, marked *Buda grandis* by Kuntze);<sup>1</sup> Uruguay, *St. Hilaire* (Paris, photo. in G.), probably not the type.<sup>2</sup> ARGENTINA: PROV. JUJUY: Dept. Tumbaya: alt. 2400 m., slopes of mts., Volcan-Cerro, Alta Cordoba, *Venturi* 4900, February 17, 1927 (G., U. S., F. M., Cal. Acad., La Plata, seeds smooth). PROV. CATAMARCA: Sancho, Dept. Andalgalá, *Jørgensen* 1607, November 15, 1915 (G., U. C., smooth seeds); Quebrada de Yacutula, *Schickendantz* 304, March, 1878 (?) (B., smooth seeds); at the summit of Cuesta Muschaca, *Schickendantz* 264, February, 1876 (B., seeds smooth); Candada, Dept. Andalgalá, *Jørgensen* 1607, February, 1897 (U. S., seeds smooth). PROV. TUCUMÁN: 2600 m. alt., Estancia Las Pavas, Dept. Chicligasta, *Venturi* 9470, March 14, 1924 (U. S., smooth seeds), and 6886, January 16, 1925 (U. S., smooth seeds); Valle de Tafi, *C. Bruch*, 1908 (La Plata; smooth seeds); Sierra de Tucuman, La Ciénaga, *Hieronymus & Lorentz*, January 10–17, 1874 (B., seeds smooth). PROV. CORRIENTES: Wald vom Riachuelo an Corrientes, *Niederlein*, January 19, 1883 (B., papillose seeds). PROV. SANTA FE: Ceres in Dist. San Cristobal, *Grippel*, October, 1892 (N. Y., papillose seeds; marked *Buda grandis* by Otto Kuntze); around Estancia Leives, Sierra Ventana, *Alboff*, November, 1895 (La Plata, seeds smooth). PROV. CORDOBA: Cordoba, *Lorentz*, November, 1877 (K., smooth seeds); Estancia Germania near Cordoba, *Lorentz* 79, June–December, 1874 (B., seeds smooth); Cordoba, *Galande*, November 19, 1880 (B. One sheet has smooth seeds, the other papillose); Cordoba, *Galande*, November 23, 1880 (B., seeds smooth); Cordoba, *Lorentz* 485 (B., only part of the coll., seeds smooth); Cordoba, *Hieronymus*, October, 1877 (B., smooth seeds); Cordoba, *Lorentz* 324<sup>b</sup>, December, 1870 (B., seeds smooth); Lagunas de Peitiado around Cordoba, *Galande*, February 25, 1881 (B., smooth seeds); Potrero de Laya, Sierra Chica, *Galande*, November 31, 1879 (B., seeds smooth); Estancia La Reduccion, Sierra Chica, *Burkart* 7182, December 26, 1935 (G., seeds smooth); Rio Zeballas, Sierra Chica, *Galande*, January 17, 1878 (B., seeds smooth); *Hieronymus*, Sommer, 1874–75 (B., seeds smooth); Cuesta de Copina, las Envenadas Sierra Achala, *Hieronymus*, January 8, 1876 (B., seeds smooth); Cuesta de Ayel, Sierra Achala, *Hieronymus*, January 12–14, 1876 (B., seeds smooth); San Miguel, Sierra Grande, *Hieronymus*, March 27, 1875 (B., seeds smooth); 1400 m. alt., Copina, Sierra Grande, *Burkart* 7181, December 29, 1935 (G., seeds smooth);

<sup>1</sup> Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13, Sept. 28 (1898).

<sup>2</sup> Montevideo, the locality given in Fl. Bras. is not on label; the + Cambess. Uruguay on the label is in the handwriting of Spach, and the *S. ramosa* is in secretarial handwriting. Data by courtesy of Mr. C. A. Weatherby.



sands on the banks of the Rio Primavera, Cordoba, *Lorentz* 324<sup>b</sup>, 1870 (B., seeds smooth); San Francisco, *Lorentz* 324, February, 1871 (B., 2 sheets, seeds smooth); Prov. Cordoba, no locality, *Lossen* 36, January 25 (G., F. M., B.; only Field Museum coll. mature, seeds smooth); between S. Vicente and the estate of Rueda, Sierra Chica *Kurtz* 6585, December 14, 1889 (La Plata, seeds smooth). PROV. LA RIOJA: between Cueva de la Mesada and Sucrucijada, Sierra Famatina, *Hieronymus & Niederlein* 528, January 31, 1879 (B., seeds smooth); Vallecito, Sierra Famatina, *Hieronymus & Niederlein* 611, January 21, 1879 (B., seeds smooth); Las Tranquitas, Sierra Famatina, *Hieronymus & Niederlein*, February 10, 1879 (B., immature). PROV. SAN JUAN: Cuesta Nueva, *Hosseus* 2540a, February 28, 1927 (B., immature). PROV. SAN LUIS: Cerro Retana, Sierra de San Luis, *Vignati* 294, January, 1934 (La Plata, seeds smooth); Estancia Grande, *Vignati* 68, January, 1934 (La Plata, seeds smooth); Rio de las Baranquitas, *Vignati* 235, January, 1934 (La Plata, immature). PROV. BUENOS AIRES: low, brackish ground about the Rio Paraná, Campana F. C. C. A., *Burkart* 5663, November 5, 1933 (B., seeds smooth); in barren pastures, Campana, *Parodi* 8604, October 27, 1928 (G., B., seeds huddled or smooth); in barren ground, Campana, *Parodi* 11326, November 21, 1933 (G., seeds smooth); in sandy ground, Isla Mariel, Buenos Aires, *Parodi* 8717, December 10, 1928 (G., papillose seeds); in the hills of Curumalán Pigüe F. C. S., *Burkart* 4836, November 14, 1932 (B., seeds smooth); Cerros on the Pigüe, *Scala*, November 7, 1928 (La Plata, seeds smooth); Cerros and Laguna de Puan, *Scala*, November 10, 1928 (La Plata, seeds smooth); Pergamino, *Parodi* 6635, November 12, 1925 (B., seeds smooth); saline places in the fields, Partido Azul, Estancia Salaberry, *Osten* 205, mid-November, 1886 (B., smooth seeds); Wilde F. C. S., *Burkart* 3929, October 20, 1931 (B., immature); Carhuë, Sierras Pampeanas, *Lorentz* 320<sup>c</sup>, April, 1881 (B., seeds smooth); Arroyo Cortapié, Sierras Pampeanas, *Lorentz* 320<sup>b</sup>, March 19, 1881 (B., seeds smooth); Sierra Ventana, Sierras Pampeanas, *Lorentz* 320<sup>a</sup>, February–April, 1881 (B., seeds smooth); Sierras Pampeanas, *Lorentz* 360, February–April, 1881 (B., seeds smooth); Sierra Ventana, *Alboff* (La Plata, seeds smooth); Bahia Blanca, *Darwin*, early in October, 1832 (K.); Carmen de Patagones, *C. Berg* 33, November 17, 1874 (B., seeds smooth). PROV. RIO NEGRO: vicinity of General Roca (alt. 250–360 m.), *Walter Fischer* 65, December 29, 1914 (G., U. S., N. Y., F. M., seeds smooth); northern bank of Rio Negro, near the island Choele-Choel, *Lorentz*, May 29, 1879 (B., seeds smooth); common between Laguna de Las Bandurrias and Fortin Fé, *Lorentz*, April 24, 1879 (B., seeds smooth); Rio Negro, *Scala* 46 and 48, January, 1916 (La Plata, seeds smooth); Rio Negro, *Wilkes Exped.* 1838–42 (G., U. S., N. Y., seeds smooth). PROV. CHUBUT: seacoast, Port Madrin, *Bettfreund* 52 (B., seeds smooth). PATAGONIA: Quilbay, *Bettfreund* 1249, March, 1893 (B., seeds smooth); Patagonia, *Moreno & Tonini* 343, 1882 (N. Y.,

marked *Buda media* Dum. (L.) by Kuntze; over-ripe, no seeds).<sup>1</sup> PROV. SANTA CRUZ: Port Desire, *Darwin* (K., seeds smooth); 200 m., Minerales, *Donat* 197, November 14, 1929 (G., Cal. Acad., F. M., U. C., seeds smooth); Cañadon de las Vacas (Sec. xv), *Beoufals* (?) (La Plata, seeds smooth). BOLIVIA: DEPT. COCHABAMBA: 2700 m. alt. Cerritas, *Steinbach* 4007, April 16, 1920 (B., elongate inflorescence showing tendency toward *S. pazensis*, seeds smooth); 2600 m., Cochabamba, *Bro. Julio II* 262, 1932 (U. S., open inflorescence, habit showing tendency toward *S. pazensis*, seeds smooth); 3000 m., Cochabamba, *Kuntze*, March 26, 1892 (N. Y., seeds smooth, protracted inflorescence showing tendency toward *S. pazensis*; marked *Buda grandis* by Otto Kuntze);<sup>2</sup> common on the slopes of the hills, Cochabamba, *Parodi* 10193, February 15, 1932 (G., hubbled seeds, protracted open inflorescence similar to that of *S. pazensis*). DEPT. LARECAJA: 2600–2790 m. alt. near Sorata, *Mandon* 946, 1898 (?) (N. Y., F. M., typical of *S. ramosa*, seeds smooth);<sup>3</sup> 7000 ft., Sorata, *R. S. Williams* 1541, October 2, 1902 (N. Y., seeds papillose on the rim, habit typical of *S. ramosa*). Without locality: *Haenke*<sup>4</sup> (B., marked *Spergularia macrocarpa* Presl<sup>5</sup> and also *Lepigonum marinum* by Kindberg, 1861; seeds smooth and typical of *S. ramosa*).

At first it seems odd that one species should have both smooth and papillose seeds. Further study reveals a few specimens with papillae confined to the swollen rim of the seed, leaving the flat sides smooth, and a few more specimens only slightly hubbled in the same pattern as the papillae of the papillose seeds. The smooth seeds are generally a little larger, 0.7–0.9 mm. long, the majority 0.8 mm., while the papillose ones are 0.6–0.8 mm., the majority between 0.7 and 0.8 mm. But since the shape, color, and wings of both are the same and since both have similar capsules, sepals, leaves, stipules, and geographic range, the papillose-seeded trend deserves no taxonomic recognition. A few specimens in Bolivia have elongate inflorescences and habit similar to *S. pazensis*, which see for discussion.

The only St. Hilaire specimen in the Paris Museum that could be the type of *S. ramosa* has neither the handwriting of Cambessedes, nor the type locality, Montevideo. The plant has longer internodes in the inflorescence and therefore more lax habit than is usual in the

<sup>1</sup> Cited under *Buda marina* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

<sup>2</sup> Cited under *Buda grandis* by Kuntze, l. c. (1898).

<sup>3</sup> Cited under *S. villosa* var. *a genuina* Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 268, t. 61, fig. 1 (1872).

<sup>4</sup> Locality given in Presl, Reliq. Haenk. ii. 9 (1831), "Habitat in Peruviae montanis huanoccensibus et in Cordilleris de Chile."—which is probably incorrect because this species is not known from Chile and Haenke did go to Buenos Aires and Montevideo where it is common.

<sup>5</sup> Cited as type of *Spergularia macrocarpa* by Presl, Rel. Haenk. ii. 9 (1831).

wide-ranging species under discussion. According to the description of Cambessedes in St. Hilaire, Fl. Bras. ii. (1829), the internodes below should be 6-8 lines or ca. 12-16 mm. long, the pedicels 1-4 lines or ca. 2-8 mm. long, and the internodes above should be twice as long as those below. The plant labeled *S. ramosa* in Paris has the internodes below 25-30 mm. long, the peduncles 7.5-12.5 mm. long, and the internodes below equal to those above. It must be assumed, then, at present, that this plant is not the type but was probably identified by Cambessedes. However, the detailed description by Cambessedes coincides in all measurements and other characters with the species under discussion. It may now be asked whether the plant in the Paris Museum could belong to another species of the region. It differs from *S. levis* in having light brown, unsculptured seeds with dark brown papillae and an entire wing, glandular-pubescent inflorescence and capsule equal to the calyx. It also differs from *S. grandis* in having light brown, unsculptured seeds and 3-valved capsules nearly equal to the calyx. This plant may possibly be *S. ramosa* var. *diffusa*, because of its elongate inflorescence and small seeds which measure 0.5 mm. in length. However, the seeds are not mature and the capsule does not protrude from the calyx as is characteristic of the variety. Therefore, the sensible thing to do is to relegate the plant to *S. ramosa* for the present with the hope that future collecting will throw more light upon the subject. The name *S. ramosa* is, therefore, retained on the strength of Cambessedes' good description.

36. Var. **diffusa**, var. nov. (TAB. 595, FIG. 1e-1g). Perennis: radice centrali farinacea cortice leve suberea, interdum 1 cm. crassa: caulibus 2-6, erectis, 15-35 cm. longis, interdum ramosis infra; internodiis caulis partis efloriferi glabris vel villosoglandulosis, vulgo longis gracilibusque, 10-42 mm., vulgo 15-25 mm. longis, 0.6-1.5 mm., vulgo 0.8-1.2 mm. crassis; foliis fasciculatis, filiformibus, mucronatis, 15-50 mm. longis, 0.6-1.2 mm. latis, vulgo villosoglandulosis interdum glabris, saepe late patentibus pseudoverticillatis; stipulis triangularibus acuminatis, vulgo tam longis quam latis, 1.2-5 mm., vulgo 1.2-3 mm. longis; floribus in cymam patentem dispositis semper villosoglandulosis; internodiis 10-30 mm., vulgo 13-20 mm. longis, 0.4-1 mm. latis; bracteis minimis, 1-3 mm. longis; sepalis ovatis, abrupte acutis, villosoglandulosis, 3.2-5 mm. longis; petalis albis ovatis, 2.5-4 mm. longis, vulgo sepalis 0.5-1.2 mm. brevioribus; staminibus 6-9; stylis 3, ad basim divis, 0.7-0.8 mm. longis; capsulis maturis 5-8 mm. longis, sepalis  $\frac{1}{3}$  (2-3.8 mm.) longioribus; pedicellis fructiferis haud reflexis, infimis 5-20 mm. vulgo 10-15 mm. longis; seminibus vulgo papillatis interdum levibus, 0.6-0.8 mm., vulgo 0.6-0.7 mm.



longis, caetera eis varietatis typicae similibus.—Usually not separated as a variety and identified under the incorrect epithet *grandis*, as in the following: *Tissa grandis* sensu Morong & Britt. in Ann. N. Y. Acad. Sci. vii (Enum. Pl. Paraguay) 53 (1892), in part, including Morong 921 and excluding Buenos Aires 3 which is *S. villosa*, non *Spergula grandis* Pers. (1805); sensu Chod. & Hassl. in Bull. Herb. Boiss. sér. 2. iii. (Pl. Hassl. ii. 171, reprint) (1903), at least in part, *i. e.* Hassler 1188 (the other coll. cited not seen), non *Spergula grandis* Pers. (1805).—SOUTH AMERICA: In Paraguay and in the northern interior of Argentina. PARAGUAY: Gran Chaco, Andrew Pride, (K., seeds papillose); near Assomption in the prairies in impermeable clay soil, Balansa 2272, September 25, 1875 (K., seeds papillose); Loma Clavel, lat. S. 23° 20', Gran Chaco, Rojas 2475, November, 1903 (G., F. M., seeds papillose); in fields, Tacural, Hassler 1188 (N. Y., immature); Pilcomayo River, Morong 921 (1888–1890) (G., U. S., N. Y., F. M., seeds papillose). ARGENTINA: PROV. FORMOSA: Formosa, Jörgensen 3202, August, 1919 (G., U. S., seeds papillose). PROV. JUJUY: in saline soil, Piquete (?), R. E. Fries 486, 1901 (U. S., over-ripe, no seeds); on saline, sandy banks of Laguna de la Bier, R. E. Fries 110, 1901 (U. S., seeds papillose). PROV. TUCUMÁN: calcareous ground, Cerro del Campo, Dept. Burruyacu, Venturi 7722, December 16, 1928 (G. TYPE, U. S., seeds papillose); border saline lakes, Chanar Pojo, Dept. Leales, Venturi 466, September 18, 1919 (U. S., immature). PROV. ENTRE RIOS: Concepcion del Uruguay, Niederlein, May 11, 1880 (B., over-ripe, no seeds). PROV. SANTA FÉ: Colonia Humboldt, Dist. Colonias, E. Hunyiker 40, October 6, 1875 (B., seeds papillose but immature); Chaco Santa-fecino, Lanteri (F. C. S. F.), Burkart 5750, November 10, 1933 (B., seeds papillose). PROV. CORDOBA: Gusapampa, Dept. Minas, Hieronymus, March 17, 1877 (B., seeds smooth); Troncho-payo around Carroya, Galander 35, November 27, 1880 (B., seeds not mature); Cordoba, Kurtz (N. Y., immature); Cordoba, Kuntze, December, 1891 (N. Y., La Plata, seeds papillose); Rio Zeballos, Sierra Chica, Galander, February 14, 1878 (B., seeds papillose). PROV. LA RIOJA: Nonogasta, Dept. Chilecito, Venturi 7791 December 28, 1928 (G., U. S., seeds smooth). MAP 30.

Var. *diffusa* differs from the typical variety of the species in having longer internodes, more fleshy tap-root, usually smaller stipules, shorter sepals, shorter styles, more protruding capsule, and usually smaller seeds. It is the same as the typical variety in number of stamens, length of pedicels, and type of seeds and wing.

37. *S. LEVIS* Camb. (PLATE 596, FIGS. 2a–2c, MAP 31). *Perennial, entirely glabrous*, with a tap-root: *caudex* bearing from 2–6 stems, erect or nearly so, 20–40 cm. long; *internodes of stem below the inflorescence* glabrous, 28–50 mm. long, 1.2–3 mm., usually 1.2–2 mm., thick; *leaves not fascicled*, or sometimes 1–2 leaves at the axil, linear-filiform,

usually blunt at the apex, 22–80 mm., usually 30–45 mm. long, the very long ones occurring only toward the base, 0.8–1.6 mm., usually 1–1.4 mm. wide, always glabrous; *stipules* very broadly lanceolate-acuminate, 3.5–7 mm., usually 4.5–6 mm. long; *inflorescence* a strict cyme, *always glabrous throughout*, with the internodes shorter than those below, the lower 5–30 mm., usually 10–25 mm. long, 0.4–0.7 mm. wide; *bracts* filiform, wanting or as much as 8 mm. long; *sepals* ovate, abruptly acute, broadly scarious-margined, glabrous, 2.8–6.8 mm. long; *petals* ovate, white, 2 mm. long; *stamens* 7–10; *styles* 3, separated to base, 0.3–0.6 mm. long; *mature capsules greatly exceeding the calyx*, 5–8.4 mm., usually 6–8 mm. long, 1.6–3.4 mm., usually 2–3 mm. longer than the calyx; *fruiting pedicels* filiform, glabrous, never reflexed, the lower 7–20 mm. long; *seeds* 0.6 mm. long, *deep reddish-brown, often glistening, pyriform, surface covered with closely interwoven, deep, vermiform sculpture, with reddish, glandular papillae scattered at regular intervals over the whole surface, always surrounded by a scarious, white, erose wing*, 0.2–0.4, usually between 0.2 and 0.3 mm. wide.—Camb. in St. Hilaire, Fl. Bras. ii. 176 (1829); G. Don, Gen. Hist. Dichl. Pl. i. 426 (1831); Kindb. Synop. 16 (1856), among the species excluded from *Lepigonum*; Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270, fig. 62 (1872), in part (including the following parts of the description: 3-merous element, glabrous calyx and erose wing of seed, including also the figure, except for the capsules with five valves and collections, Rocha, St. Hilaire, and Rio de Janeiro, Sello; excluding at least part of the Montevideo, Brasil, Sello coll., which is *S. grandis*, q. v.); Arech. in Anal. Mus. Nac. Montevideo, vi. iii. (Fl. Uruguay i.) 94 (1901). *Arenaria bonariensis* Gill. in Hook. & Arn. Misc. Bot. iii. 148 (1832); Steud. Nom. Bot. ed. 2, i. 123 (1840), in part, excluding reference, *Spergularia rupestris* Camb. *Spergula laevis* (Camb.) D. Dietr. Syn. Pl. ii. 1599 (1840); Steud. Nom. ed. 2, ii. 617 (1841). *Lepigonum laeve* (Camb.) Kindb. Mon. Lepig. 32, t. ii, fig. 18 (1863). *Buda grandis* sensu Kuntze, Rev. Gen. iii. pt. ii. 13 (1898), in part (including citations, Sierra de Solis, Uruguay, and Buenos Aires, Haughtal 661; excluding the remainder of citations which belong with *S. ramosa*, q. v.), non *Spergula grandis* Pers. (1805). *Spergularia bonariensis* (Gill.) Hicken, Chloris Plat. Argent. 104 (1910), as to source of name, but only in part as to plants, including only the reference *S. laevis* Camb. (specimens cited have not been seen by the author).—SOUTH AMERICA: Southern Brazil and common in Uruguay and in the Argentine about Buenos Aires. BRAZIL: Ad ripas S. João, Sello, November 23<sup>1</sup> (B., marked *Lepigonum laeve* (Cambess.) by Kindberg 1861); no locality, St. Hilaire 2039 (Paris, probably TYPE, photo. in Gray,<sup>2</sup> immature, and B., marked *Lepigonum laeve* by Kind-

<sup>1</sup> According to Rohrb. in Mart. Fl. Bras. xiv. pt. ii. 270 (1872), the locality for this is "ad ripas fluminis S. João, Rio de Janeiro." Cited by Kindberg under *Lepigonum laeve*, Mon. Lepig. 32 (1863).

<sup>2</sup> One label has *Spergularia levis* + probably in Cambessedes' handwriting. The other was written by Spach. This specimen may not be the type because it does not

berg, 1861, immature).<sup>1</sup> URUGUAY: Sierra de Solis,<sup>2</sup> Kuntze, November, 1892 (B., N. Y., both marked *Buda grandis* (Pers.) Camb. by Kuntze;<sup>3</sup> littoral, Playa Ramirez, Hugh M. Smith 139, October 29, 1922 (U. S., has one 4-valved capsule); Barra del Sta. Lucia, Dept. San José, Herter 159<sup>d</sup>, November, 1927 (N. Y.); Montevideo, Sello, October 22 (B.); in the fields, Montevideo, Gibert 751, October, 1867 (K.), October, 1858, Montevideo (K.); alt. 0-10 m., Pocitos-Malvin, Dept. Montevideo, Herter 76260, November 23, 1924 (B.); Montevideo, Gibert 168 (K.). ARGENTINA: PROV. ENTRE RIOS: im trocken, steinigen Camp vor d. Lagune, Concepcion del Uruguay, Lorentz, October, 1875 (B.); Concepcion del Uruguay, Lorentz sub 282, October, 1875 (B.); Concepcion del Uruguay, Niederlein 15, May 7, 1880 (B.). PROV. BUENOS AIRES: Delta del Paraná, Corabelas, Burkart 4462, February 16, 1932 (B.); sandy brackish flats near the Paraná,<sup>4</sup> Campana F. C. C. A., Burkart 5667, November 5, 1933 (B.); Saavedra, Bettfreund 1022, 1896 (B., only part of the plants on the sheet); in abundance in la Baca Palermo, Barracas, etc. around Buenos Aires, C. Berg 220, October, 1875 (B.); Buenos Aires, Hauthal 661, 1891 (N. Y., from Herb. Otto Kuntze and marked *Buda grandis* presumably by him);<sup>5</sup> plains of Buenos Aires, Gillies (K., photo. in G., type of *Arenaria bonariensis* Hook. & Arnott); Buenos Aires 5, Gillies (K.);<sup>6</sup> Buenos Aires 188 and 188a, Bettfreund (B.); Punta Lara, Alboff 1895 (La Plata); rich meadows between La Plata and Ensenada, Cabrera 1774, October 9, 1931 (U. S., F. M., immature); La Plata, E. L. Ekman 1875, October 20, 1907 (N. Y.). TERR. SANTA CRUZ: 200 m. alt., Minerales, Donat, 198, October 16, 1929 (G., N. Y., F. M., Cal. Acad., U. C.,<sup>7</sup> nearly mature (N. Y. is mature) but with unusually short stems).

This species is distinguished from others of similar habit of the same region by its entirely glabrous quality (hence the name *levis*) and the strongly erose margin of the seed. It is further distinguished from *S. ramosa* by its darker, sculptured seeds, strongly protruding capsules, shorter styles, and longer internodes throughout the whole plant. It is further separated from *S. grandis* by its three-valved capsules and three shorter styles.

(To be continued)

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have the definite type-locality, Rocha, Uruguay. Photo. and data by courtesy of Mr. C. A. Weatherby.

<sup>1</sup> Cited under *Lepigonum laeve* by Kindb. Mon. Lepig. 32 (1863).

<sup>2</sup> At the junction of Minas, Canelones and Maldonado Prov.

<sup>3</sup> Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

<sup>4</sup> On such, low, flat, barren ground all the species of *Spergularia* of the region seem to assemble.

<sup>5</sup> Cited under *Buda grandis* by Kuntze, Rev. Gen. iii. pt. ii. 13 (1898).

<sup>6</sup> Hooker, Bot. Misc. iii. 148 (1832) says, "Ditches near Buenos Aires—Dr. Gillies." Neither the sheet with "n. sp. Gillies" on the label nor the one marked "B. A. 5 Gillies" have this actual data recorded upon them, though they are both mounted on Herb. Hook. sheets under *Arenaria bonariensis* Gill.

<sup>7</sup> Possibly introduced from Buenos Aires and Montevideo?



DISSEMINATION BY ANTS OF THE SEEDS OF  
*TRILLIUM GRANDIFLORUM*

BURTON N. GATES

THE fruit of *Trillium* is three-celled, subglobose, varying around one-half inch in long diameter and contains numerous seeds. When ripe, separating at the calyx, the fruit falls to the ground without opening, but seeds are exposed at the base of the capsule where it is detached. The seeds are relatively large, easily seen, and change in color, on exposure to the air, from a whitish or light brown to a darker, reddish brown. On removal from the fruit, the ovate seeds appear to be coated with a viscous or gelatinous substance, which will dry. Moisture apparently revives this viscosity. (The viscous or gelatinous quality suggests that there may be an adaptation for seed-dispersal by means of adhesion to animals.) At the hilum is a spongy caruncle, roughly one-fourth the bulk of the seed. Similar fleshy material forms the axis of the fruit. The capsule when quite empty is thin and papery. Apparently, the plant has no mechanical means of scattering its seeds.

For experimentation on the germination of seeds of *T. grandiflorum* Salisb. we had received a request for all of the fresh seeds which could be procured from our plants. The first fruits ripened, falling readily into the hand, on July 13, 1939 (Worcester, Mass.), four fruits being collected that evening. The next morning a number of fruits had ripened and had fallen to the ground. Surprisingly, on examination not one of these had a seed remaining in it; after a prolonged search, not a seed could be found on the ground. Examination of empty capsules revealed that they had been thoroughly cleaned out, leaving only the thin, papery shell. It was far from apparent how these viscous seeds could have completely disappeared from the capsules and the ground in such a short time. There had been no rain. The next day more ripened fruits were collected; more emptied capsules were seen beneath the plants, all quite devoid of seeds. It was recalled then, that on the previous day, two empty capsules each contained a black ant. Instantly, a relationship between ants and the disappearance of the seeds was suspected.

A test was made. A freshly harvested fruit was offered to a black ant (species undetermined) crawling on the ground. With apparent familiarity, she at once mounted the fruit, at the freshly-exposed end. Within a few seconds she dug out a seed, adjusted it in her mandibles,

and started off. She was traced. Presently, she disappeared among a heap of small garden-stones (about a half-pailful). Simultaneously, numerous *Trillium* seeds were observed scattered about the base of the stone pile. A second ant found under the *Trillium* plants, was offered a freshly picked fruit, but before it could be placed on the ground, she reared, and turned toward the fruit, exhibiting a positive interest in it. She, like the other ant, extracted a seed and carried it off in the direction of the stone heap, about twelve to fifteen feet from the *Trillium* plants.

Seeds scattered about the base of the stones were gathered with forceps. Then, one-by-one, the stones were carefully removed, thus exposing many more seeds, seemingly dropped between stones and not in the small galleries beneath stones. Quite conclusively, the seeds had been discarded by the ants. No seed was found more than eighteen inches from the stone pile. In all seventy seeds were recovered.<sup>1</sup>

As more stones were removed, the entire colony was found to have concentrated beneath a larger stone, about the size of a hand. In the midst of this confusion, two ants were seen, each carrying a fresh *Trillium* seed with the caruncle. Doubtless these were the seeds offered but a few minutes before in the tests. The ant colony was estimated at around five hundred individuals. No larvae or pupae were seen. There was no apparent gallery or tunnel below the surface of the ground. All galleries or chambers were found beneath the small stones. At first regarded as a temporary nest, in reality this was probably a permanent one.

There was no indication that the ants used the seeds in any manner comparable to the ways of the harvester-ants; not one seed was found eaten, nor was there the slightest evidence of storing. On the contrary, the seeds were quite definitely scattered and discarded around the nest. The caruncle (and possibly the gelatinous coating) appeared to have been eaten off consistently. Fleishy material, in appearance like the caruncle, occurs in the capsule, which the ants clean out apparently for food. There is evidence that the fruits may be eaten into, before they fall from the plants; a number were observed gnawed at the point of attachment, but whether a seed had been removed, could not be positively determined. Black ants were seen exploring all over the plants, particularly after the last fruit had been harvested.

<sup>1</sup> Sir John Lubbock (1894) is quoted as having seen ants carry seeds to their nests, but it is not clear what seeds or for what purpose.

There is no doubt of the appeal of the caruncle to the ants; it attracts them no less than nectar attracts bees. Quoting William Morton Wheeler (Ants . . . 1910. p. 315), "Surnander (1903) and other botanists believe that ants eat the caruncles." The present study seems to confirm that hypothesis, especially so, since there had been no rain between the first ripening of the capsules and the final observations.

Bloodroot seeds, *Sanguinaria canadensis* L., have caruncles. These observations on Trillium seeds are paralleled by those of Dr. E. B. Southwick as told by Dr. Wheeler (ibid). Dr. Southwick observed ants carrying off bloodroot seeds and feeding on the caruncles. In the writer's garden this may account for the recent appearance of a bloodroot seedling, some twenty feet upgrate from the nearest group of bloodroot plants.

These two New England natives, *Trillium grandiflorum* and *Sanguinaria canadensis*, lack mechanical means of seed-dispersal. Each have ample caruncles, seemingly of food value to ants, which, serving as lures, suggests that seed-dispersal is accomplished through the agency of ants. Seeds discarded in the debris of ant nests should find a favorable medium for germination.

WORCESTER, Massachusetts.

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CYPERUS MICROIRIA ON LONG ISLAND.—A specimen collected at Hempstead, Long Island, by E. P. Bicknell in 1906 and first recorded in the 2nd edition of Britton & Brown's Illustrated Flora I, 301 (1913) as *Cyperus Iria* L., was referred to *C. amuricus* Maxim. by Prof. Fernald and Mr. Griscom in RHODORA XXXVII, 148 (1935). There are, however, two closely allied species in Eastern Asia which are distinguished from *C. Iria* in having distinctly mucronate scales, i. e. *C. amuricus* Maxim. and *C. microiria* Steud. The difference between the two plants was clearly pointed out in Bot. Mag. Tokyo XLVII, 236-239 (1933) by Prof. Nakai who carefully examined authentic specimens of related species during his trip in Europe. A specimen from Long Island well agrees with Japanese specimens of *C. microiria* and is not the true *C. amuricus* of which I have also examined the isotype specimen in the Gray Herbarium. *C. microiria* differs from *C. amuricus* by having shortly mucronate scales which are generally more yellowish and more compound inflorescences, and is an inter-



mediate species between *C. amuricus* and *C. Iria*. It is a native of Japan proper, Korea, Manchuria and China, and *C. Iria* var. *acutiglumis* Fiori from Italy is also identical with that species. According to Prof. Nakai, *C. amuricus* var. *japonicus* Miquel is a form of the true *C. amuricus* with shorter spikelets. The synonymy of *C. microiria* is summarized as follows:

CYPERUS MICROIRIA Steudel, Syn. Pl. Glum. II, 23 (1855). Syn. *Cyperus Textori* Miquel in Ann. Mus. Bot. Lugd.-Bat. II. 141 (1865). *C. Iria* β. *microiria* (Steudel) Franch. et Sav., Enum. Pl. Jap. II. 103 (1876). *C. Iria* var. *Hance* ex C. B. Clarke in Journ. Linn. Soc. XXI, 138 (1884). *C. japonicus* Makino in Bot. Mag. Tokyo XVIII, 53 (1904) excl. syn. Miq.; non *C. japonicus* Miq. 1865. *Chlorocyperus Franchetii* Palla in Österr. Bot. Zeitschr. LIX, 193, t. 3, f. 6 (1909). *Cyperus Iria* var. *acutiglumis* Fiori, Fl. Ital. Exsicc. ser. 2, no. 1231 (1910). *C. Iria* var. *microiria* (Steudel) E. G. Camus in Fl. Gén. Indo-Chin. VII, 59 (1912) quoad syn. *C. amuricus* var. *subirioides* Kükenthal in Fedde, Rep. XXVII, 107 (1929). *C. Iria* var. *microiria* (Steudel) Koidzumi, Fl. Symb. Or.-Asia. 37 (1930). *C. amuricus* var. *Textori* (Miq.) Kükenthal in Sinensia III, 80 (1932). *C. amuricus* var. *japonicus* (non Miquel) sensu Kükenthal in Engler, Pfl.-reich IV<sup>20</sup>, Lief. 1, 153 (1935) excl. syn. nonnull.—HIROSHI HARA, Gray Herbarium.

ASTER KUMLIENI: A CORRECTION.—Apparently the first use of the name *Aster Kumlieni* in print is by Gray in 1886 in Synoptical Flora I<sup>2</sup>: 179, where, under the citation "*A. Kumleini*, Fries, in distrib. Mus. Ups. no. 5," it appears as a synonym of *A. oblongifolius* Nutt., var. *rigidulus* A. Gray. The same treatment is accorded *Aster Kumlieni* by Nelson in New Manual of Rocky Mountain Botany, and by Robinson and Fernald in the 7th ed. of Gray's Manual. The name itself appears not to have been validly published until 1906, in Rydberg's Flora of Colorado. Rydberg also treated it as a good species in his later Flora of the Rocky Mountains and Flora of the Prairies and Plains, separating it from *A. oblongifolius* as a lower, more western plant, with more rigid, slightly broader and rougher leaves, and a distinctly fastigiate habit. In Britton & Brown's Illustrated Flora it is treated as a synonym of *A. oblongifolius*. It is noteworthy that, in all these works, the uniform spelling *A. Kumleini* appears.

Mr. Ray M. Koon, Head of the Cedar Hill Field Station of Massachusetts State College, Waltham, Mass., has prepared for the new edition of *Standardized Plant Names* what is perhaps the first complete checklist of *Aster* species thus far compiled. In writing Mr. Koon,

December 5, 1939, about his list, I asked this question: "Is *Aster kumlcini* correct? I have sometimes wondered if the eponym of this aster might not be Thure Kumlien, Wisconsin's distinguished early naturalist and botanist, about whom the late Dr. E. L. Greene wrote his charming sketch in *Pittonia* 1: 250-260. 1889." Mr. Koon turned my inquiry over to Mr. Weatherby of the Gray Herbarium, from whom he obtained, under date of December 9, this informing reply:

Mr. Dayton is apparently correct. The name *Aster Kumlcini* was taken up by Gray from Fries who, so far as I know, merely used it on the labels of specimens distributed, but never otherwise published it. We have an isotype here with a copied label in Dr. Gray's hand which reads as follows:

"Th. Kumlien. Plant. Viscons. Exs. No. 5. Aster (apparently Kumlcini written over to Kumlieni. Directly under this is written) Aster Kumlieni E. Fries. Albion, Dane Co. Distrib. e. Mus. Upsal."  
"Viscons." is, of course, Scandinavian phonetics for Wisconsin. From the rewriting and doubling of the name it is reasonably certain that Dr. Gray himself made the correction proposed by Mr. Dayton; so far as I know, he did not publish it.

Mr. Weatherby also suggested that it would be well to put the matter on record. This note is in answer to the generous invitation of Messrs. Weatherby and Koon. It now appears overwhelmingly evident that the proper spelling of this name is *Kumlieni*.—WILLIAM A. DAYTON, U. S. Forest Service, Washington.

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GENTIANA **Pennelliana**, nom. nov. *Diploma tenuifolia* Raf. Fl. Tell. iii. 27 (1837). *Dasystephana tenuifolia* (Raf.) Pennell in Bull. Torr. Bot. Cl. xlv. 183 (1919). *G. tenuifolia* (Raf.) Fernald in RHODORA, xli. 557 (1939), not Petrie in Trans. N. Z. Inst. xlv. 270 (1913).

I am indebted to Miss Marjorie Stone for directing my attention to Petrie's New Zealand species of 1913. For the beautiful white-flowered Florida representative of the more northern blue-flowered *Gentiana Stoneana* Fernald, l. c. 555, t. 579 (1939) I am glad to propose the name *G. Pennelliana*, in recognition of Dr. FRANCIS W. PENNELL who in 1919 clearly established the specific distinctness of the two.—M. L. FERNALD.

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ARTHRAOXON HISPIDUS var. CRYPTATHERUS IN NEW YORK.—The establishment of *Arthraxon hispidus* var. *cryptatherus* (Hack.) Honda in Virginia is sustained by recent collections in Elizabeth City Co., RHODORA, Vol. 38, page 395, 1936, Sussex Co., RHODORA, Vol. 41,

page 529, 1939. In the herbarium of the New York Botanical Garden are *Hermann* 9923, collected in Arlington Co., Va. (1938) and *Monachino* 404, Rock Creek Park, Washington, D. C. (1937).

But the station north of the District of Columbia, reported by Hitchcock's Manual of the Grasses of the United States, p. 725, has been questioned by Fernald, *RHODORA*, Vol. 38, p. 395 (1936) and its standing clarified by Chase in the same publication, Vol. 39, p. 100. This record (from Pennsylvania), according to Chase, is founded on the examination of a specimen at the U. S. National Herbarium collected by *F. L. Scribner* on ship's ballast, Philadelphia, in 1878.

Has the Philadelphia station of over 60 years ago been destroyed? Regardless, this grass might easily flourish in Pennsylvania, as I have observed it for the last four years as a vigorous weed in the grounds of the New York Botanical Garden, Bronx, New York (No. 397, collected Oct. 6, 1937).—JOSEPH MONACHINO, New York Botanical Garden.

## VIOLA CUCULLATA IN MISSOURI

JULIAN A. STEYERMARK

WHEN material of *Viola* was examined in connection with the preparation of Palmer & Steyermark's Annotated Catalogue of the Flowering Plants of Missouri, it was found that a large number of specimens, which were in reality *Viola papilionacea*, had been misidentified as *Viola cucullata*. In fact, no authentic material of *Viola cucullata* from Missouri had ever turned up.

This confusion between *Viola papilionacea* and *Viola cucullata* was largely due to the perpetration of the latter name in early check-lists of and works on Missouri plants, notably by Daniels,<sup>1</sup> Eggert,<sup>2</sup> Engelmann Botanical Club,<sup>3</sup> and Tracy,<sup>4</sup> and by the continued application of the name in various articles written in earlier journals and scientific periodicals in connection with the vegetation of the state. The best diagnostic characters separating these two species are brought out by Brainerd in Robinson and Fernald's 7th edition of Gray's New

<sup>1</sup> Daniels, F. *Flora of Columbia, Missouri, and Vicinity*. Univ. Mo. Stud. Sci. Ser. 1: 179. 1907.

<sup>2</sup> Eggert, H. *Catalogue of the Phaenogamous and Vascular Cryptogamous Plants in the Vicinity of St. Louis, Missouri*. 1891.

<sup>3</sup> Engelmann Botanical Club. *Preliminary Check-list of the Cryptogams and Phanerogams in the Vicinity of St. Louis, Missouri*. 1911.

<sup>4</sup> Tracy, S. M. *Catalogue of the Phaenogamous and Vascular Cryptogamous Plants of Missouri*. Jefferson City, 1886.



Manual of Botany, wherein, "Beard of lateral petals strongly knobbed; cleistogamous flowers long and slender" for *V. cucullata* is contrasted with "Beard of lateral petals not strongly knobbed; cleistogamous flowers ovoid or ovoid-acuminate" for *V. papilionacea* and related species. The character of the knobbed or unknobbed beard of the lateral petals is particularly obvious, and if specimens had been carefully examined for this point by collectors, many misidentifications could have been avoided. On this basis it was found that all Missouri material at one time identified or recorded as *V. cucullata* proved on examination to be *V. papilionacea*.

In the spring of 1938, the author was collecting in some swampy meadows in the southeastern Ozarks, and chanced upon a stemless blue violet which had all the characteristics of *Viola cucullata*. The peduncles exceeded the leaves and the beard on the lateral petals appeared strongly knobbed. Moreover, the plants were growing in a swampy meadow, a habitat shared by a number of rare and isolated species of more northern and eastern range, which in this portion of the Ozarks, and in such habitats, are at their southern and southwestern limits of dispersal. Species of just such rarity which were associated with the violet in this or in other similar meadows in the southeastern Ozarks, were *Menyanthes trifoliata* var. *minor*, *Liparis Loesclii*, *Aster puniceus* var. *lucidulus*, *Galium tinctorium* (*G. Claytoni* of authors), and *Cirsium muticum*. Further examination of the violet showed without doubt that it was *Viola cucullata*, and the identification has been verified by Dr. M. L. Fernald. The collection is from a marshy meadow in valley of North Prong of Bee Fork, T32N, R2W, Sect. 23, 5 miles east of Bunker, Reynolds County, May 26, 1938, *J. A. Steyermark* 5488. Specimens have been deposited in the Gray Herbarium and in the Herbarium of Field Museum.

The range of *Viola cucullata* may now be extended southwestward to include southeastern Missouri, and it is expected that future exploration may reveal its occurrence in other swampy meadows of the southeastern Ozarks. *Viola papilionacea*, on the other hand, common throughout Missouri, is found in a variety of habitats, most commonly in alluvial or open woods, along streams, waste ground, and even crevices of bluffs.

FIELD MUSEUM OF NATURAL HISTORY  
Chicago, Illinois.

*Volume 42, no. 496, including pages 97-144 and plates 590-592, was issued 2 April, 1940.*

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